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to me, Dorota

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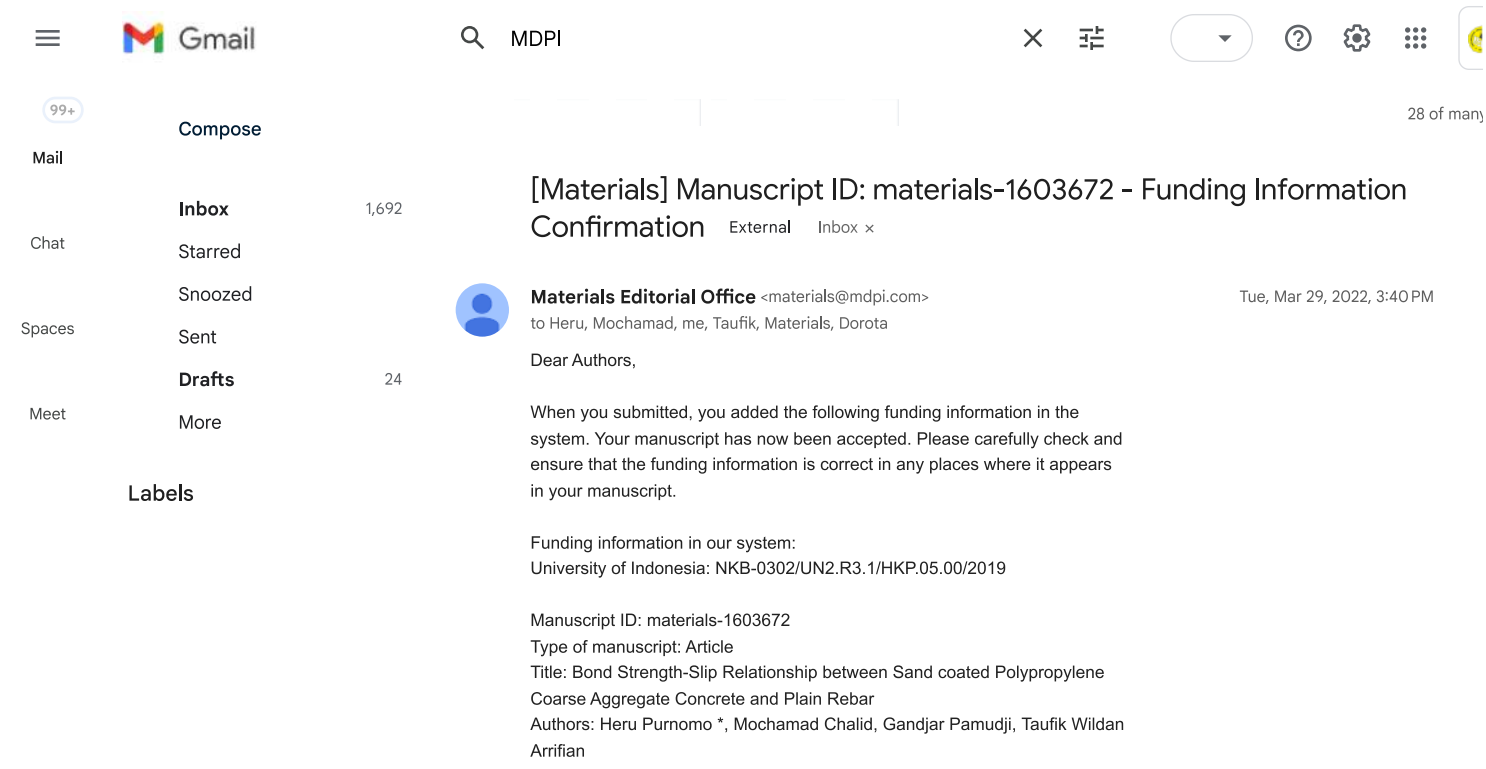
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to Heru, Mochamad, me, Taufik, Materials, Dorota
Dear Authors,
When you submitted, you added the following funding information in the system. Your manuscript has now been accepted. Please carefully check and ensure that the funding information is correct in any places where it appears in your manuscript.
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University of Indonesia: NKB-0302/UN2.R3.1/HKP.05.00/2019
Manuscript ID: materials-1603672
Type of manuscript: Article
Title: Bond Strength-Slip Relationship between Sand coated Polypropylene Coarse Aggregate Concrete and Plain Rebar
Authors: Heru Purnomo *, Mochamad Chalid, Gandjar Pamudji, Taufik Wildan Arrifian

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Materials Editorial Office <materials@mdpi.com> Tue, Mar 29, 2022, 3:40 PM
to Heru, Mochamad, me, Taufik, Materials, Dorota

Dear Dr. Purnomo,

Congratulations on the acceptance of your manuscript, and thank you for your interest in submitting your work to Materials:

Manuscript ID: materials-1603672
Type of manuscript: Article
Title: Bond Strength-Slip Relationship between Sand coated Polypropylene Coarse Aggregate Concrete and Plain Rebar
Authors: Heru Purnomo *, Mochamad Chalid, Gandjar Pamudji, Taufik Wildan Arrifian
Received: 2 February 2022
E-mails: herupur@eng.ui.ac.id, chalid@eng.ui.ac.id, gandjar.pamudji@unsoed.ac.id, wildantrf@gmail.com

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Journal: Materials (https://www.mdpi.com/journal/materials) (ISSN 1996-1944)

Manuscript ID: materials-1603672

Type: Article

Title: Bond–Slip Relationship between Sand-Coated Polypropylene Coarse Aggregate Concrete and Plain Rebar (https://www.mdpi.com/1996-1944/15/7/2643)

Authors: Heru Purnomo * , Mochamad Chalid , Gandjar Pamudji , Taufik Wildan Arrifian

Abstract: Recycling plastic waste as aggregate in concrete mixtures is one of the important issues in the construction industry since it allows the reduction of building weight and has beneficial effects on the environment. In addition, the bonding ability of this kind of lightweight concrete to reinforcement is also a prerequisite as a composite material in forming reinforced concrete structures. Therefore, in this study the bond of plain rebar embedded in artificial lightweight aggregate concrete made from polypropylene plastic waste coated with sand were investigated. The pull-out test of nine-group specimens was conducted to study the bond strength of plain rebar embedded in polypropylene plastic waste coarse aggregates lightweight concrete (PWCAC), failure mode and bond strength-slip relationship. The test results show that the bond strength-slip relationship and bond strength depend on the concrete compressive strength and bar diameter for PWCAC. Meanwhile for all PWCAC specimens tested, the pull-out failure modes were observed. A bond strength equation for PWCAC is formulated by performing a regression analysis on the experimental results and afterward is combined with an existing bond strength-slip equation for normal concrete to have the bond-slip formulation for the lightweight concrete studied. Comparison between the model and experimental results indicate a close agreement.

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Authors' Responses to Reviewer's Comments (Reviewer 1)

Author's Notes: Response to Reviewer 1 Comments

Point 1: Abstract could be further improved by using some quantitative results.

Response 1: In the study, bond strength equation was proposed and bond-slip relationship were established using existing formulations, we found difficulties to present some quantitative results in the abstract.

Point 2, 3 and 4:. The Introduciton is well written, however, the authors are suggested to include some latest studies on the use of plastic waste in concrete, for example.

-Effect of partial replacement of E-waste as a fine aggregate on compressive behavior of concrete specimens having different geometry with and without CFRP confinement. *Journal of Building Engineering*, 104151.

- Effect of waste electronic plastic and silica fume on mechanical properties and thermal performance of concrete. *Construction and Building Materials*, *285*, 122952

Response 2,3 and 4: The 2 latest studies have been included in the manuscript.

Point 5:. Figure 1, the figures could be improved by remove the uncessary drops in the stress strain relation ship

Response 5: It has been improved by removing the drops.

Point 6:. Figures 4-5, there are blank columns, the authors may merge and imporive the display.

Response 6: It has been improved by merging the Figures

Point 7:. The authors can provide details of experimental program in table for better understanding.

Response 7: Table 4, 5 and 6 provide the details of experimental program.

Point 8:. How to define stable residual bond strength

Response 8: Stable residual bond stress is taken 63% of the peak value when $s = 10s_1$. s is the slip measured at the loaded end during the test (mm), and s_1 is the slip corresponding to the ultimate bond strength .

Point 9:. The failure modes need to ellaborate more along with some more figures

Response 9: Three more pictures are added (Figure 9) to show pull-out failure pattern in PWCA concrete for three rebar diameter 10 mm, 12 mm and 16 mm

Point 10:. Figure 3-5 show two graphs of the bond strength-slip relationship: the first is ascend-ing and descending, the second is ascending, horizontal, and descending. Its better to re-write and simplified

Response 10: It has been revised to the following paragraph**.** Figures 3 to 5 show two graphs of the bond stress-slip relationship. The first graph consists of ascending and descending curves. Besides those two curves, the second graph has a small horizontal line that connects the peaks of ascending and the beginning of descending curves

Point 11:. Conclusions are written in simple way, concised and and to the point. conclusions could be better.

Response 11: We have erased the last paragraph of the Conclusions to accommodate other reviewer's comments.. Plain rebar issue is placed in the Introduction.

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	Yes	Can be improved	Must be improved	Not applicable
Does the introduction provide sufficient background and include all relevant references?	( )	(x)	( )	( )
Is the research design appropriate?	(x)	( )	( )	( )
Are the methods adequately described?	( )	(x)	( )	( )
Are the results clearly presented?	( )	(x)	( )	( )
Are the conclusions supported by the results?	( )	(x)	( )	( )

Comments and: The article "Bond Strength-Slip Relationship between Sand coated Polypro-pylene Coarse Aggregate Concrete and Plain Rebar" is quite interesting and well written.

Suggestions for Authors

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2. The Introduciton is well written, however, the authros are suggested to inlcude some latest studies on the use of plastic waste in concrete, for example.
3. Effect of partial replacement of E-waste as a fine aggregate on compressive behavior of concrete specimens having different geometry with and without CFRP confinement. *Journal of Building Engineering*, 104151.
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Type: Article

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Authors' Responses to Reviewer's Comments (Reviewer 2)

Author's Notes: Response to Reviewer 2 Comments

Point 1: The term “bond strength-slip relationship” is not reasonable, it should be “bond stress-slip relationship” or “bond-slip relationship”, because bond strength means ultimate bond stress.

Response 1: The title of the manuscript has been corrected to bond-slip relationship**.**

Point 2:. Why PWCA should be “sand coated” before use, what is the production process? Please add some explanation

Response 2: PP plastic waste that has been shredded is fed into an injection machine to be shaped like natural coarse aggregate and is referred to as plain plastic aggregate (PAP). Afterward it was coated with hot sand by placing the uncoated plastic aggregate into a rotating cylinder. The PAP and final shape of plastic aggregate coated with sand PWCA is shown in Figure 1 The coating is intended to improve bonding at the interface between coarse aggregate and mortar.

Point 3:. Please add some introduction of the main parameters and the main conclusions.

Response 3: It has been added to the last paragraph of the introduction.

Point 4:. Introduction, Line 2. The expression “reinforced concrete composite material” should be corrected as “reinforced concrete”

Response 4: It has been corrected as “reinforced concrete”.

Point 5:. Deformed rebar is more commonly used than plain rebar in construction industry, but only plain rebar was tested in this research, please add some explanation.

Response 5: British Design Code BS 8110 is widely used as current national codes of practice for the reinforced concrete structure in several countries in Africa, .such as Nigeria and Uganda. (Ekolu S.O, 2020). Two reinforcing steel bars are classified in the BS 8110. One of them is plain round bars of characteristic yield strength 250 N/mm^2. Based on this fact, the plain rebar was used in this study.

Point 6:. Generally, the language of this manuscript should be improved and polished.

Response 6: We will re-improved the language of the manuscript for the final revision**.**

Point 7:. Figure 1. Some unexpected sudden drops occurred, please add some explanation and optimize the figure..

Response 7: The unexpected sudden drops in Figure 1 has been removed. The explanation is given in Table 2.

Point 8:. Table 3. Generally, the recycled aggregate is introduced by means of equal volume replacement. If the variable is concrete strength, the W/C ratio should be changed; if the effect of PWCA is tested, the replacement ratio of PWCA should be changed. However, only the content of PWCA is changed in this test while other factors is constant, that is unreasonable. How can we determine that the difference of test result is influenced by different concrete strength rather than the different content of coarse aggregate? If the coarse aggregate used in this research is not PWCA but normal aggregate, can a similar conclusion be drawn? In addition, the reference specimens made of normal aggregate concrete is not found in this test and the replacement ratio of PWCA is not changed, so how to evaluate the influence of PWCA? Please add some explanation

Response 8: .The reference specimen made of normal aggregate is added and presented in Table 6. Analysis of the influence of concrete compressive strength to the bond strength is presented in the Figure 10.

Point 9:. Equation 1, Pu should be the ultimate axial load.

Response 9: It has been corrected to Pu.

Point 10:. Figure 3-5, 11-13. What the last character of each specimen “A-D” means?

Response 10: There are 4 specimens for each group of LC and rebar diameter. Those specimens are named as A,B, C, D accordingly. However some of the specimens could not be tested as the rebar is not straight and some others are not well connected to the tension beam during the test which resulting of bad results.

Point 11:. Figure 3-5, 11-13. Please add another figure to put the bond-slip curves of different groups of specimens together, for comparison

Response 11: An example is given in the Figure 13 where more than 30% of the test results are plotted in the Figure.

Point 12:. Section 3.3, Figure 7. Please prove this conclusion “the increase in the bond strength is caused by an increase in the compressive strength of the concrete” is statistically significant. Because the strength difference between LC20 specimen and LC23 specimen is relatively large, the bond strength is basically unchanged, while the difference of concrete strength between LC23 and LC26 is relatively small, but the difference of bond strength is relatively larger.

Response 12: The increase in the bond strength caused by an increase in the concrete compressive strength is not statistically significant as the R2 is too low (from Figure 10), the value of Pearson correlation is 0.34 and weak evidence is given by p-value of 0.095.

Point 13:. Section 3.3.1. The word “proposed” should be changed, because in this section only two existed models were compared with test results

Response 13: The word “proposed” has been removed.

Point 14:. Conclusions, Paragraph1. please specify “two existing models” and “older model”, to make it easier to understand.

Response 14: In conjunction with the proposed ultimate bond strength, two existing models derived previously by Popovics and MC2010 (FIB, 2010) could be used to predict the bond strength-slip curves for plain rebar embedded in this lightweight concrete. However Popovics’s model gave better overall ascending and descending curves compared to the experimental results. Paragraph 1 has been re-written using the above sentences.

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Does the introduction provide sufficient background and include all relevant references?	( )	( )	(x)	( )
Is the research design appropriate?	( )	( )	(x)	( )
Are the methods adequately described?	( )	( )	(x)	( )
Are the results clearly presented?	( )	( )	(x)	( )
Are the conclusions supported by the results?	( )	( )	(x)	( )

Comments and

Suggestions for Authors

This paper provides some experimental data of the bond strength between plain steel rebar and sand coated polypro-pylene coarse aggregate concrete, provides some reference to further study in this area. However, the innovation of this research is not high enough, the design of experiment is not reasonable, and the analysis based on the test results is not deep enough. Generally speaking, the quality of this manuscript needs further improvement, it is not recommended for potential publication in this journal. The specific comments are given below.

1. The term “bond strength-slip relationship” is not reasonable, it should be “bond stress-slip relationship” or “bond-slip relationship”, because bond strength means ultimate bond stress.
2. Why PWCA should be “sand coated” before use, what is the production process? Please add some explanation.
3. Please add some introduction of the main parameters and the main conclusions.
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6. Generally, the language of this manuscript should be improved and polished.
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11. Figure 3-5, 11-13. Please add another figure to put the bond-slip curves of different groups of specimens together, for comparison.
12. Section 3.3, Figure 7. Please prove this conclusion “the increase in the bond strength is caused by an increase in the compressive strength of the concrete” is statistically significant. Because the strength difference between LC20 specimen and LC23 specimen is relatively large, the bond strength is basically unchanged, while the difference of concrete strength between LC23 and LC26 is relatively small, but the difference of bond strength is relatively larger.
13. Section 3.3.1. The word “proposed” should be changed, because in this section only two existed models were compared with test results.
14. Conclusions, Paragraph1. please specify “two existing models” and “older model”, to make it easier to understand.

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Journal: Materials (https://www.mdpi.com/journal/materials) (ISSN 1996-1944)

Manuscript ID: materials-1603672

Type: Article

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Authors: Heru Purnomo * , Mochamad Chalid , Gandjar Pamudji , Taufik Wildan Arrifian

Abstract: Recycling plastic waste as aggregate in concrete mixtures is one of the important issues in the construction industry since it allows the reduction of building weight and has beneficial effects on the environment. In addition, the bonding ability of this kind of lightweight concrete to reinforcement is also a prerequisite as a composite material in forming reinforced concrete structures. Therefore, in this study the bond of plain rebar embedded in artificial lightweight aggregate concrete made from polypropylene plastic waste coated with sand were investigated. The pull-out test of nine-group specimens was conducted to study the bond strength of plain rebar embedded in polypropylene plastic waste coarse aggregates lightweight concrete (PWCAC), failure mode and bond strength-slip relationship. The test results show that the bond strength-slip relationship and bond strength depend on the concrete compressive strength and bar diameter for PWCAC. Meanwhile for all PWCAC specimens tested, the pull-out failure modes were observed. A bond strength equation for PWCAC is formulated by performing a regression analysis on the experimental results and afterward is combined with an existing bond strength-slip equation for normal concrete to have the bond-slip formulation for the lightweight concrete studied. Comparison between the model and experimental results indicate a close agreement.

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Authors' Responses to Reviewer's Comments (Reviewer 2)

Author's Notes: Response to Reviewer 2 Comments

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Comments

This was well-written. There were some issues with punctuation, grammar and syntax. USEnglish is used. I have madecitations consistent with APA (alphabetical; no initials unless two authors of same name in same year).

1. Ensure correct tense for context
2. Ensure verbs and nouns match in singular and plural forms
3. Use the when speaking of something specific and a or an when it can be any
4. Use pronouns and connectives for better flow and to avoid repetition

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	Yes	Can be improved	Must be improved	Not applicable
Does the introduction provide sufficient background and include all relevant references?	(x)	( )	( )	( )
Is the research design appropriate?	(x)	( )	( )	( )
Are the methods adequately described?	(x)	( )	( )	( )
Are the results clearly presented?	(x)	( )	( )	( )
Are the conclusions supported by the results?	(x)	( )	( )	( )

Comments and Suggestions for Authors	The reviewer's comments have been well addressed.
Submission Date	02 February 2022
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Authors' Responses to Reviewer's Comments (Reviewer 3)

Author's Notes: Response to Reviewer 3 Comments

Point 1: This manuscript discussed the experimental results of bond tests on Sand coated Polypropylene Coarse Aggregate Concrete and Plain bars. The research on bond between new materials and traditional reinforcement is important, however, this manuscript should be improved before publication. The main problem here is, the research on bond between new matrix and bar should be focused on the different bond behaviour bringing by the change of matrix, while this manuscript has no discussion on the effects of new aggregates on ITZ or bond-slip relations. Other than that, the methodology and analysis of the experimental work is imprecision. For one thing, the number of test results showed here are inadequate to provide a bond-slip model or a prediction. That's why the regression has such a low relative coefficient value. For another, the 'direct pull out tests' used in this manuscript only represents the bond-slip relations under compression loads, while the critical service condition for most reinforced concrete is under flexual-tension. The direct pull out test is acceptable when used to compare the bond strength between different samples, however, when is comes to the bond-slip model, the results from beam test or beam-end test should be considered. Last but not the least, the conclusion in the manuscript is a wrong case for a research article.

Response 1: Effects of the sand coated polypropylene coarse aggregate (PWCA) on ITZ was discussed in the author's previous work. The interfacial transition zone (ITZ) between cement paste and PWCA showed a tendency to have a uniform and smaller gaps compared to natural coarse aggregate (NCA) because the PWCA surface is rougher due to the formation of sand layers in PWCA as shown in 1(a) and Figure 1 (b). Interlocking properties between the cement paste and the plastic coarse aggregates are better than for natural coarse aggregates.

Fig 1a. Transition zone between mortar and NCA	Fig 1b. Transition zone between mortar and PWCA

Reference: Pamudji. G.. Satim. M.. Chalid. M.. & Purnomo. H. (2020). The influence of river sand and volcanic sand as coatings on waste polypropylene coarse aggregates towards concrete compressive strength. *Jurnal Teknologi. 82*. https://doi.org/https://doi.org/10.11113/jt.v82.14124

Response 2:. There were 4 specimens casted for each group of LC and rebar diameter. Those specimens are named as A,B, C, D accordingly. In total 36 specimens were casted. However some of the specimens could not be tested as the rebar was not straight after the casting, and some others were not taken into account as these specimens were not well connected to the tension beam during the test which resulting of bad results. As the research funds

is limited, we have followed the recommendation of minimum sample size for regressions given by Jenkins DG, Quintana-Ascencio, which is N ≥ 25.

Reference: Jenkins DG, Quintana-Ascencio PF (2020) .A solution to minimum sample size for regressions. PLoS ONE 15(2):

Response 3: We have erased the last paragraph of the Conclusions. Plain rebar issue is placed in the Introduction.

Response 4: Thank you for the insight of the direct pull-out and beam tests.

Author's Notes File: Report Notes (/user/review/displayFile/24504958/VjzfsWA3?file=author-coverletter&report=17633922)

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Quality of English Language

( ) English very difficult to understand/incomprehensible
( ) Extensive editing of English language and style required
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( ) I am not qualified to assess the quality of English in this paper

	Yes	Can be improved	Must be improved	Not applicable
Does the introduction provide sufficient background and include all relevant references?	( )	(x)	( )	( )
Is the research design appropriate?	( )	(x)	( )	( )
Are the methods adequately described?	( )	( )	(x)	( )
Are the results clearly presented?	( )	(x)	( )	( )
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Comments and Suggestions for Authors

This manuscript discussed the experimental results of bond tests on Sand coated Polypropylene Coarse Aggregate Concrete and Plain bars. The research on bond between new materials and traditional reinforcement is important, however, this manuscript should be improved before publication. The main problem here is, the research on bond between new matrix and bar should be focused on the different bond behaviour bringing by the change of matrix, while this manuscript has no discussion on the effects of new aggregates on ITZ or bond-slip relations. Other than that, the methodology and analysis of the experimental work is imprecision. For one thing, the number of test results showed here are inadequate to provide a bond-slip model or a prediction. That's why the regression has such a low relative coefficient value. For another, the 'direct pull out tests' used in this manuscript only represents the bond-slip relations under compression loads, while

the critical service condition for most reinforced concrete is under flexual-tension. The direct pull out test is acceptable when used to compare the bond strength between different samples, however, when is comes to the bond-slip model, the results from beam test or beam-end test should be considered. Last but not the least, the conclusion in the manuscript is a wrong case for a research article.

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Journal: Materials (https://www.mdpi.com/journal/materials) (ISSN 1996-1944)

Manuscript ID: materials-1603672

Type: Article

Title: Bond–Slip Relationship between Sand-Coated Polypropylene Coarse Aggregate Concrete and Plain Rebar (https://www.mdpi.com/1996-1944/15/7/2643)

Authors: Heru Purnomo * , Mochamad Chalid , Gandjar Pamudji , Taufik Wildan Arrifian

Abstract: Recycling plastic waste as aggregate in concrete mixtures is one of the important issues in the construction industry since it allows the reduction of building weight and has beneficial effects on the environment. In addition, the bonding ability of this kind of lightweight concrete to reinforcement is also a prerequisite as a composite material in forming reinforced concrete structures. Therefore, in this study the bond of plain rebar embedded in artificial lightweight aggregate concrete made from polypropylene plastic waste coated with sand were investigated. The pull-out test of nine-group specimens was conducted to study the bond strength of plain rebar embedded in polypropylene plastic waste coarse aggregates lightweight concrete (PWCAC), failure mode and bond strength-slip relationship. The test results show that the bond strength-slip relationship and bond strength depend on the concrete compressive strength and bar diameter for PWCAC. Meanwhile for all PWCAC specimens tested, the pull-out failure modes were observed. A bond strength equation for PWCAC is formulated by performing a regression analysis on the experimental results and afterward is combined with an existing bond strength-slip equation for normal concrete to have the bond-slip formulation for the lightweight concrete studied. Comparison between the model and experimental results indicate a close agreement.

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Authors' Responses to Reviewer's Comments (Reviewer 4)

Author's Notes: Response to Reviewer 4 Comments

Point 1: Why plain bars were considered for the study and are these allowed by any design code in the present time? .

Response 1: British Design Code BS 8110 is widely used as current national codes of practice for the reinforced concrete structure in several countries in Africa, .such as Nigeria and Uganda. (Ekolu S.O, 2020). Two reinforcing steel bars are classified in the BS 8110. One of them is plain round bars of characteristic yield strength 250 N/mm^2. Based on this fact, the plain rebar was used in this study.

Point 2:. What maximum size of PWCA was used? Were these graded to follow any particular standard?

Response 2: We have completed our paper with answers to your questions in the materials and methods section.

Point 3:. Why you need fineness modulus for coarse aggregates?

Response 2: The fineness modulus test is required to ensure a reasonable uniformity of gradation on lightweight aggregates from plastic waste that has changed in size due to the process of coating the surface of PAP with river sand as required in SNI 2461 2014/ASTM C330. The process of forming plastic aggregates is described in the revised manuscript in subsection 2.1.2.

Point 4:. How was non destructive compressive strength determined?

Response 4: Measurement of compressive strength using a non-destructive method with UPV was carried out on each pullout test object with three measurements and referring to ASTM C 597.

Point 5:. Why you did not test your own control specimens instead of relying on the data available in the literature?

Response 5: The control specimens of normal concrete have been added and presented in Table 6.

Point 6:. Please present a tabulated summary of your pull out testing results for better understanding of these in one glance.

Response 6: The authors have been addressed this recommendation in Table 5 and 6 in the revised manuscript..

Point 7:. Please compare your results with those available in the literature such as Rafi 2019.

Response 7: The modified formula given by Eq. (6) from Rafi (2019) is similar to the Eq (4) or (5) in the paper. In Rafi' s paper α= -0.05 Co where C_0 is the distance between the ribs of the

reinforcing bar: As plain rebar was used in this study, it is found that αf= - 0.60 is able to give representation of the descending branch.

Point 8:. All that is mentioned in the last paragraph of Conclusions comes as a surprise to the reader, as nothing of this have been discussed earlier in the paper. Please clearly mention what recent concrete standards you have referred in this section.

Response 8: The last paragraph of the conclusions is erased to accommodate other reviewer comments. The reason of using plain bar for the study has been added and explained in the introduction. The recent concrete standards are “Improved BS 8110 Codes” which is mentioned in the paper of Oguaghamba et al (2018).

Reference. O. A. Oguaghamba, M. E. Onyia and C. A. Nwokoye (2018). ON THE REVIEW OF THE BS CODE (BS 8110: PART 1, PART 2 AND PART 3) TO NIGERIA INDUSTRIAL MARKET STANDARD. Ahmadu Bello University, Zaria University National Engineering Conference 2018.

Abstract: Design of concrete structures is generally done within the framework of engineering codes, which give specific requirements for materials and methods. BS 8110 codes (Part 1, 2 and 3) are the most widely acceptable codes of practice for design and construction of civil works in Nigeria. Most often, different kinds of materials (concrete and steel) in our industrial markets do not meet up with the properties and characteristic specifications in these codes. Hence, engineers during designs, find it difficult using these codes. This study reviewed BS 8110 codes provisions to suit materials and methods, as obtainable in Nigerian industrial markets. Different formulae were developed from first principle and the principle of interpolation to fill up the gaps in the BS 8110 codes (Part 1, 2 and 3). Among these formulations are: reinforced concrete requirements for steels of grades 250 – 460; and concretes grades C15 – C50. Further improvement on BS 8110 code Part 3 was done to take in the present technological advancement in steel materials of 1.05 partial factor of safety, as in Parts 1 and 2 in compliance to Amendment No. 6 (BS 8110: Part 1, 1997). In this improved BS 8110 codes, Part 3 has over 438 design charts to facilitate ease of reinforced concrete design in Nigeria, among others, unlike the former, which has 50 design charts. There are several tables and provisions in Parts 1 and 2 to take in reinforced concrete fabrications from very low to high grade of construction materials.

Author's Notes File

Report Notes (/user/review/displayFile/24505571/fBc3GTle?file=author-coverletter&report=17634495)

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Does the introduction provide sufficient background and include all relevant references?	(x)	( )	( )	( )
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Are the results clearly presented?	( )	(x)	( )	( )
Are the conclusions supported by the results?	( )	(x)	( )	( )

Comments and Suggestions for Authors	Please see the attached file. peer-review-17634495.v2.pdf (/user/review/displayFile/24505571/fBc3GTle?file=review&report=17634495)
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Date of this review	10 Feb 2022 15:42:57

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Abstract: Recycling plastic waste as aggregate in concrete mixtures is one of the important issues in the construction industry since it allows the reduction of building weight and has beneficial effects on the environment. In addition, the bonding ability of this kind of lightweight concrete to reinforcement is also a prerequisite as a composite material in forming reinforced concrete structures. Therefore, in this study the bond of plain rebar embedded in artificial lightweight aggregate concrete made from polypropylene plastic waste coated with sand were investigated. The pull-out test of nine-group specimens was conducted to study the bond strength of plain rebar embedded in polypropylene plastic waste coarse aggregates lightweight concrete (PWCAC), failure mode and bond strength-slip relationship. The test results show that the bond strength-slip relationship and bond strength depend on the concrete compressive strength and bar diameter for PWCAC. Meanwhile for all PWCAC specimens tested, the pull-out failure modes were observed. A bond strength equation for PWCAC is formulated by performing a regression analysis on the experimental results and afterward is combined with an existing bond strength-slip equation for normal concrete to have the bond-slip formulation for the lightweight concrete studied. Comparison between the model and experimental results indicate a close agreement.

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Authors' Responses to Reviewer's Comments (Reviewer 5)

Author's Notes: Response to Reviewer 5 Comments

Point 1: English Language grammar needs revision. For example, “Therefore, in this study, the bond of plain rebar embedded in artificial lightweight aggregate concrete made from polypropylene plastic waste coated with sand were investigated.”

Response 1: Thank you for the grammar correction**.** Therefore, in this study, the bond of plain rebar embedded in artificial lightweight aggregate concrete made from polypropylene plastic waste coated with sand was investigated. We will do the grammar check again for the final revision of manuscript.

Point 2:. Abrams 1913 reference is quite old and can be omitted

Response 2: It has been omitted from the manuscript.

Point 3:. Please highlight the novelty of the manuscript at the end of the Introduction last paragraph

Response 3: A bond strength equation for PWCAC is formulated and afterward is combined with an existing bond-slip equation to have the bond-slip formulation for the lightweight concrete studied. The above sentence has been placed at the end of the Introduction last paragraph.

Point 4:. Section 2.1, “The PCC has a specific gravity range of 3.00 - 3.05”. Is this provided by the supplier? If not, then kindly mention the standard followed to determine specific gravity

Response 4: Yes, it is provided by the supplier.

Point 5:. In Table 1. Physical properties of fine aggregate, how did these physical properties determine? If any standard is followed, then kindly also mention the limiting values mentioned in the code

Response 5: T The physical properties such as specific gravity and water absorption were tested on the material referring to ASTM C128 standard, bulk density referring to ASTM C 29, and granular fineness modulus referring to ASTM C 33. This sentence has been placed in the manucript in the section 2.1.2

Point 6:. In Section 2.3, the authors stated “A total of 29 pull-out specimens were casting use PWCA with three different concrete mixtures as presented in Table 3”. If so, then how about the testing for compressive strength? Its detail is missing. Please explain the subdivision of 29 pull-out specimens. How did 29 specimens are counted for pull-out test?

Response 6: Table 4 and 5 show the detail of destructive and non-destructive testing for compressive strength, and the subdivision of the pull-out specimens**.**

Point 7:. In Figure 2, the specimen dimension is mentioned as “10d”. What is “d”? Please explain.

Response 7: d is the rebar diameter

Point 8:. Was pull-out test setup followed any standard or adapted from any literature? Please mention. What was the primary aim for 400 mm of the rebar length protruding out on one end as the free end and 30 mm of the rebar on another end as the loaded end? Please show the actual casting and testing setup for the pull-out test

Response 8: The pull out test follows RILEM TC. (1994). *Recommendations for the Testing and Use of Construction Materials, RC 6 Bond Test for Reinforcement Steel. Pull-Out Test..* It is explained in section 2.4. Figure 3 shows specimen dimension, setting and testing equipment. The 400 mm of the rebar length protruding out of on one end as the free end is taken allowing the LVDT to be placed and 30 mm of the rebar on another end as the loaded end is used to accommodate the space for connecting the rebar tip to a beam where the tension load is applied.

Point 9:. In section 2.3, the authors mentioned PVC tubes. What is PVC abbreviated for?

Response 9: PVC is the abbreaviation for Polyvinyl Chloride.

Point 10:. In Section 2.4, authors reported the dry density and compressive strength of cylindrical concrete diameter of 15 cm and a height of 30 cm were tested when the specimen was 28 days old, referring to ASTM C567 (2004) and ASTM C39 (2004) standards, respectively. However, no such testing was mentioned in section 2.3 where authors reported only about 29 pull-out specimens.

Response 10: Table 4 presents the result of cylinder compression test and its dry density obtained before conducting the test..

Point 11:. Section 3.1, the authors reported the dry unit weight and, destructive and non-destructive values of compressive strength in Table 4. However, no such information related to these tests was reported in the preceding section especially non-destructive compressive strength.

Response 11: Table 4 and 5 show the compressive strength result from destructive and non-destructive testing, and the subdivision of the pull-out specimens

Point 12:. In Eq. 1, ld is the bond length. Is this bond length for partial embedment of reinforcing bar or for length protruding out on one end as the free end?

Response 12: ld is the bond length for partial embedment of reinforcing bar.

Point 13:. In Section 3.2, authors reported, “The bond-slip curve between plain reinforcement and lightweight concrete from sand coated plastic waste aggregates is nearly similar in shape to that between plain rebar in natural aggregate concrete as obtained by Abrams (1913), Xing et al. (2015) and Cairns (2020).” The addition of this statement is worthless as theauthors did not use natural coarse aggregates for comparison. Why authors didn’t compare the results of PWAC with natural coarse aggregates concrete? Authors are advised to include the PWAC image in the manuscript.

Response 13: PWAC image are included in the manuscript as presented in the Figure 1. Comparison of bond strength from PWAC concrete with natural coarse aggregates concrete with a W/C 0,30 is given in Table 5 and 6. The bond-slip results of natural aggregate concrete NC23 with 16 mm diameter rebar are shown in Figure 7.

Point 14:. In Section 3.2, please add more information related to micro-slip.

Response 14: The authors explain the micro-slip theory adapted from the reference to the journal Wang et al. (2019), which has been presented in our article. The journal describes in detail the phase of slip.

Point 15:. The Local bond stress-slip curve for LC20, LC23 and LC26 PWCAC shown in Figures 3 to 5 must be carefully looked into and should normalize as no such curves are ever reported in the literature.

Response 15: Figures 3 to 5 for local bond stress-slip LC20, LC23 and LC26 PWCAC are not normalized and still have dimension. However the same figures are presented in dimensionless form in Figures 12 to 14.

Point 16:. In Figure 7, the compressive strength plotted on the x-axis is for destructive or non-destructive testing? Please clearly state it in the figure? What was the purpose of destructive and non-destructive testing for compressive strength? No discussion on the comparison is found in the manuscript.

Response 16: In the Figure 7 (old)**,** the compressive strength plotted on the x-axis is for non destructive testing. It has been stated in the Figure 10 (new). The compressive strength resulted from destructive testing was used to verify the compressive strength given by UPV apparatus.

Point 17:. In Figure 8, what is u/f’c?

Response 17: It should be written as τu/f'c

Point 18:. In Eq. 2, what is "d" referring to?

Response 18: d is the rebar diameter

Point 19:. For regression analysis, the data set of 29 pull-out samples is not enough

Response 19: There were 4 specimens casted for each group of LC and rebar diameter. Those specimens are named as A,B, C, D accordingly. In total 36 specimens were casted. However some of the specimens could not be tested as the rebar was not straight after the casting, and some others were not taken into account as these specimens were not well connected to the tension beam during the test which resulting of bad results. As the research funds is limited, we have followed the recommendation of minimum sample size for regressions given by Jenkins DG, Quintana-Ascencio, which is N ≥ 25.

Reference: Jenkins DG, Quintana-Ascencio PF (2020) .A solution to minimum sample size for regressions. PLoS ONE 15(2):

Point 20:. In Figure 9, what is "Eksperiment"?

Response 20: It has been corrected to "Experiment"

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Quality of English Language
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Are the conclusions supported by the results?	( )	( )	(x)	( )

Comments and Suggestions for Authors

In this experimental investigation on the bond strength-slip relationship and bond strength with concrete compressive strength and bar diameter for PWCAC is reported. The reviewer is not fully satisfied with the current version of the manuscript based on the following:

1. English Language grammar needs revision. For example, “Therefore, in this study, the bond of plain rebar embedded in artificial lightweight aggregate concrete made from polypropylene plastic waste coated with sand were investigated.”
2. Abrams 1913 reference is quite old and can be omitted
3. Please highlight the novelty of the manuscript at the end of the Introduction last paragraph
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7. In Figure 2, the specimen dimension is mentioned as “10d”. What is “d”? Please explain.
8. Was pull-out test setup followed any standard or adapted from any literature? Please mention. What was the primary aim for 400 mm of the rebar length protruding out on one end as the free end and 30 mm of the rebar on another end as the loaded end? Please show the actual casting and testing setup for the pull-out test.
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14. In Section 3.2, please add more information related to micro-slip.
15. The Local bond stress-slip curve for LC20, LC23 and LC26 PWCAC shown in Figures 3 to 5 must be carefully looked into and should normalize as no such curves are ever reported in the literature.
16. In Figure 7, the compressive strength plotted on the x-axis is for destructive or non-destructive testing? Please clearly state it in the figure? What was the purpose of destructive and non-destructive testing for compressive strength? No discussion on the comparison is found in the manuscript.
17. In Figure 8, what is u/f’c?
18. In Eq. 2, what is “d” referring to?
19. For regression analysis, the data set of 29 pull-out samples is not enough.
20. In Figure 9, what is “Eksperiment”?

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Manuscript ID: materials-1603672

Type: Article

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Authors: Heru Purnomo * , Mochamad Chalid , Gandjar Pamudji , Taufik Wildan Arrifian

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Authors' Responses to Reviewer's Comments (Reviewer 5)

Author's Notes: Response to Reviewer 5 Comments

Point 1: Abstract: Please revise “Recycling plastic waste” as “recycling of plastic waste” or “recycled plastic waste” as aggregate in concrete mixtures is one of the important issues in the construction industry since it allows the reduction of building weight and has beneficial effects on the environment.

Response 1: It has been revised to “recycled plastic waste”

Point 2: Page 3: Authors abbreviated plain plastic aggregate as (PAP). Please confirm

Response 2: Plain plastic aggregate has been abbreviated to PPA.

Point 3: Table 1: The column heading “RS” seems a shorthand form and is not described in the manuscript. Please explain

Response 3: The abbreviation of river sand as “RS” has been added in the beginning of section 2.1.2

Point 4: Table 2, first column: Please rephrase “Diameter of rebar d (mm)” as “Diameter of rebar, d (mm)”

Response 4: It has been addressed in Table 2, first column.

Point 5: Figure 4: It was previously pointed out that the graphical representation of bond slip vs slip needs to be normalized

Response 5: It has been normalized as presented in the Figures 4 to 7

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Are the conclusions supported by the results?	( )	(x)	( )	( )

Comments and Suggestions for Authors

The authors of the manuscript "Bond-Slip Relationship between Sand coated Polypropylene Coarse Aggregate Concrete and Plain Rebar" significantly improved the quality of the manuscript; however, there are still shortfalls, which are as follows:

Abstract: Please revise “Recycling plastic waste” as “recycling of plastic waste” or “recycled plastic waste” as aggregate in concrete mixtures is one of the important issues in the construction industry since it allows the reduction of building weight and has beneficial effects on the environment.

Page 3: Authors abbreviated plain plastic aggregate as (PAP). Please confirm

Table 1: The column heading “RS” seems a shorthand form and is not described in the manuscript. Please explain

Table 2, first column: Please rephrase “Diameter of rebar d (mm)” as “Diameter of rebar, d (mm)”

Figure 4: It was previously pointed out that the graphical representation of bond slip vs slip needs to be normalized

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