Review Form 3

Journal Name:	**Asian Journal of Chemical Sciences**
Manuscript Number:	**Ms_AJOCS_123614**
Title of the Manuscript:	**SELF-HEALING BUILDING MATERIALS FOR ENHANCED DURABILITY AND SUSTAINABILITY IN CONSTRUCTION**
Type of the Article	**Review Article**

General guidelines for the Peer Review process:

This journal's peer review policy states that **NO** manuscript should be rejected only on the basis of '**lack of Novelty'**, provided the manuscript is scientifically robust and technically sound.
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PART 1: Review Comments

Compulsory REVISION comments	**Reviewer's comment**	**Author's Feedback** *(Please correct the manuscript and highlight that part in the manuscript. It is mandatory that authors should write his/her feedback here)*
Please write a few sentences regarding the importance of this manuscript for the scientific community. Why do you like (or dislike) this manuscript? A minimum of 3-4 sentences may be required for this part.	This manuscript addresses a critical issue in the construction industry—enhancing the durability and sustainability of building materials through self-healing technologies. It is significant as it explores innovative solutions that can potentially reduce maintenance costs, extend the lifespan of structures, and contribute to environmental sustainability by minimizing material waste. The comprehensive examination of self-healing materials and their applications in construction provides valuable insights for both academic researchers and industry practitioners.	
Is the title of the article suitable? **(If not please suggest an alternative title)**	The title, "SELF-HEALING BUILDING MATERIALS FOR ENHANCED DURABILITY AND SUSTAINABILITY IN CONSTRUCTION," is appropriate as it clearly reflects the content and focus of the review article. It encapsulates the main themes of durability, sustainability, and self-healing technologies in construction materials	
Is the abstract of the article comprehensive? Do you suggest the addition (or deletion) of some points in this section? Please write your suggestions here.	The abstract provides a good overview of the manuscript, summarizing the main topics covered, such as the principles, mechanisms, and applications of self-healing materials in construction. However, it could benefit from a more concise presentation and inclusion of specific examples or findings to enhance clarity and impact. the abstract should emphasize the novelty and practical implications of the discussed technologies	
Are subsections and structure of the manuscript appropriate?	The manuscript is well-structured, with clear subsections that logically flow from the introduction to the conclusion. Each section is appropriately detailed, covering different aspects of self-healing materials, from their chemical mechanisms to practical applications in various industries, including construction.	
Please write a few sentences regarding the scientific correctness of this manuscript. Why do you think that this manuscript is scientifically robust and technically sound? A minimum of 3-4 sentences may be required for this part.	While the manuscript is scientifically robust and technically sound in many aspects, there are a few scientific errors and inaccuracies that need to be addressed: 1. Inconsistent Terminology: The manuscript sometimes uses different terms for the same concept, such as "self-healing materials" and "automatic healing materials." It is essential to use consistent terminology throughout the manuscript to avoid confusion. 2. Mechanisms of Self-Healing: The description of self-healing mechanisms, particularly the thermodynamics section, could be more precise. The statement "According to thermodynamics, a chemical reaction cannot happen spontaneously unless its total energy dG (=dH-TdS) is less than zero" is somewhat misleading. It should be clarified that this refers to the Gibbs free energy change (ΔG), and for a process to be spontaneous, ΔG should be negative. 3. Types of Self-Healing Processes: The manuscript discusses various types of self-healing processes, such as autogenous healing, bacterial-based healing, and chemical healing. However, the differences between these processes are not always clearly defined. For example, the distinction between autogenous and chemical healing processes should be made clearer, emphasizing their respective mechanisms and applications. 4. Material Properties: The statement "Self-healing materials possess superior mechanical properties insulation heat insulation and high molecular weight" is vague and lacks specificity. The properties should be described more precisely, such as detailing the types of mechanical properties (e.g., tensile strength, elasticity) and providing examples of specific materials with these properties. 5. Application Examples: Some applications of self-healing materials are described too broadly. For instance, the section on space applications could benefit from more specific examples and detailed explanations of how self-healing materials are used in these contexts. Providing case studies or specific instances of successful implementations would enhance the manuscript's credibility. 6. Recent Advances: The manuscript could be improved by including more recent studies and advancements in self-healing materials. Some references are outdated, and incorporating the latest research would provide a more current perspective on the field.	

Are the references sufficient and recent? If you have suggestions of additional references, please mention them in the review form. **-**	**Removal of Weak References** Certain references weaken the arguments and should be removed: 1. Yang, Y., Kamon, Y., Lynd, N. A., & Hashidzume, A. (2020). Self-Healing Thermoplastic Elastomers Formed from Triblock Copolymers with Dense 1,2,3-Triazole Blocks. Macromolecules. doi: 10.1021/acs.macromol.0c02080 2. Gwak, E.-J., Jeon, H., Song, E., & Kim, J.-Y. (2020). Self-Healing of Nanoporous Gold Under Ambient Conditions. Nano Letters, 20(9), 6706–6711. doi: 10.1021/acs.nanolett.0c02551 3. Xu, M., Cheng, B., Sheng, Y., Zhou, J., Wang, M., Jiang, X., & Lu, X. (2020). The high-performance crosslinked self-healing material based on multiple dynamic bonds. A.C.S. Applied Polymer Materials. doi:10.1021/acsapm.0c00154 4. Xun, X., Zhang, Z., Zhao, X., Zhao, B., Gao, F., Kang, Z., Zhang, Y. (2020). Highly Robust and Self-Powered Electronic Skin Based on Tough Conductive Self-Healing Elastomer. A.C.S. Nano. doi:10.1021/acsnano.0c04158 5. Shinde, V. V., Celestine, A.-D., Beckingham, L. E., & Beckingham, B. S. (2020). Stereolithography 3D Printing of Microcapsule Catalyst-Based Self-Healing Composites. A.C.S. Applied Polymer Materials. doi:10.1021/acsapm.0c00872 6. Crall, M. D., & Keller, M. W. (2017). Targeted Self-Healing by Magnetically Guiding Microcapsules. A.C.S. Applied Materials & Interfaces, 9(7), 6504–6511. doi:10.1021/acsami.7b00459 7. Utrera-Barrios, S., Hernández Santana, M., Verdejo, R., & López-Manchado, M. A. (2020). Design of Rubber Composites with Autonomous Self-Healing Capability. A.C.S. Omega. doi:10.1021/acsomega.9b03516 8. Qin, Y., Wang, J., Qiu, C., Xu, X., & Jin, Z. (2019). A Dual Crosslinked Strategy to Construct Moldable Hydrogels with High Stretchability, Good Self-Recovery, and Self-Healing Capability. Journal of Agricultural and Food Chemistry, 67(14), 3966–3980. doi: 10.1021/acs.jafc.8b05147 9. Nie, J., Huang, J., Fan, J., Cao, L., Xu, C., & Chen, Y. (2020). Strengthened, Self-healing and Conductive ENR-based Composites Based on Multiple Hydrogen Bonding Interaction. A.C.S. Sustainable Chemistry & Engineering. doi:10.1021/acssuschemeng.0c04136 10. Fan, B., Zhang, K., Liu, Q., & Eelkema, R. (2020). Self-healing injectable polymer hydrogel via dynamic thiol-alkynone double addition crosslinks. A.C.S. macro letters, 9(6), 776-780. 11. Wu, X., Wang, J., Huang, J., & Yang, S. (2019). Robust, stretchable, and self-healable supramolecular elastomers synergistically crosslinked by hydrogen bonds and coordination bonds. A.C.S. applied materials & interfaces, 11(7), 7387-7396. 12. P.-G. de Gennes, C. R. Hebd. Seances Acad. Sci., Ser. B, 1980, 291, 219. 13. Ferl, J., Ware, J., Cadogan, D., & Yavorsky, J. (2007). Self-healing technology for gas retention structures and space suit systems (No. 2007-01-3211). S.A.E. Technical Paper. https://doi.org/10.4271/2007-01-3211 **Outdated References** Several references are outdated and should be replaced with more recent studies: 1. Wu, M., Johannesson, B., & Geiker, M. (2012). A review: Self-healing in cementitious materials and engineered cementitious composite as a self-healing material. Construction and Building Materials, 28(1), 571-583. 2. Wu, D.Y., Meure, S., Solomon, D. (2008). Self-healing polymeric materials: A review of recent developments, Prog. Polym. Sci. (Oxford). 33 (5)479–522, https://doi.org/10.1016/j.progpolymsci.2008.02.001. 3. Stephanopoulos, G., & Reklaitis, G. V. (2011). Process systems engineering: From Solvay to modern bio-and nanotechnology.: A history of development, successes and prospects for the future. Chemical engineering science, 66(19), 4272-4306. https://doi.org/10.1016/j.ces.2011.05.049 4. Wool, R., & O'connor, K. M. (1981). A theory crack healing in polymers. Journal of applied physics, 52(10), 5953-5963. 5. P. G. de Gennes, Reptation of a Polymer Chain in the Presence of Fixed Obstacles, J. Chem. Phys., 1971, 55, 572. 6. Klein, J. (1978). Evidence for reptation in an entangled polymer melt. Nature, 271(5641), 143-145. 7. Kim, Y. H., & Wool, R. P. (1983). A theory of healing at a polymer-polymer interface. Macromolecules, 16(7), 1115-1120. 8. Kloxin, C. J. (2013). Reversible Covalent Bond Formation as a Strategy for Healable Polymer	

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14. Swapan, K. G. (2009). Self-healing Materials: Fundamentals, Design Strategies, and Applications. Copyright 2009 WILEY-VCH Verlag GmbH & Co. KGaA, Weinheim ISBN: 978-3-527-31829-2
15. Yan, Q., Feng, A., Zhang, H., Yin, Y., & Yuan, J. (2013). Redox-switchable supramolecular polymers for responsive self-healing nanofibers in water. Polymer Chemistry, 4(4), 1216-1220.
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18. Chen, X., Wudl, F., Mal, A. K., Shen, H., & Nutt, S. R. (2003). New thermally remendable highly crosslinked polymeric materials. Macromolecules, 36(6), 1802-1807.
19. Francesconi, A., Giacomuzzo, C., Grande, A. M., Mudric, T., Zaccariotto, M., Etemadi, E., ... & Galvanetto, U. (2013). Comparison of self-healing ionomer to aluminium-alloy bumpers for protecting spacecraft equipment from space debris impacts. Advances in Space Research, 51(5), 930-940.
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Minor REVISION comments **Is the language/English quality of the article suitable for scholarly communications?**	**Grammatical Errors and Language Quality** The language quality is generally suitable for scholarly communication, but there are a few grammatical errors and awkward phrasings that should be corrected for better readability. Here are some specific corrections: 1. **Abstract:** ○ **Original:** "Self-healing materials possess the intrinsic ability to repair damage autonomously mitigating the impact of wear weathering and structural stress." ○ **Correction:** "Self-healing materials possess the intrinsic ability to repair damage autonomously, mitigating the impact of wear, weathering, and structural stress." 2. **Introduction:** ○ **Original:** "Self-healing materials possess superior mechanical properties insulation heat insulation and high molecular weight." ○ **Correction:** "Self-healing materials possess superior mechanical properties, such as insulation, heat resistance, and high molecular weight." 3. **Section 1.2 (The Chemistry behind Self-Healing Polymers):** ○ **Original:** "Determining and controlling overall polymerization processes are crucial for the core concept of a polymer's ability to repair itself." ○ **Correction:** "Determining and controlling the polymerization processes are crucial for enabling a polymer's ability to repair itself." 4. **Section 3.0 (Applications of SHM):** ○ **Original:** "SHMs will play a crucial role in such regions [2223]." ○ **Correction:** "SHMs will play a crucial role in such areas [22, 23]."	
Optional/General comments	**Proofreading and Editing Recommendations:** • Ensure all sentences are complete and avoid run-on sentences. • Use commas to separate clauses and improve readability. • Check for consistency in tense and voice throughout the manuscript. • Utilize a professional proofreader or language editing service if necessary.	

PART 2:

	Reviewer's comment	**Author's comment** *(if agreed with reviewer, correct the manuscript and highlight that part in the manuscript. It is mandatory that authors should write his/her feedback here)*
Are there ethical issues in this manuscript?	*(If yes, Kindly please write down the ethical issues here in details)*	

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