Review of: "Nanomaterials: History, Production, Properties, Applications, and Toxicities"

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Potential competing interests: No potential competing interests to declare.

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Title: Nanomaterials: History, Production, Properties, Applications, and Toxicities

Review Comments

Accept after a major revision

1) The text moves from historical context to modern applications, but the transition feels abrupt. It could be better if it had a clearer link between ancient uses and how they have inspired contemporary nanotechnology. The historical account and dynamics of the growth process if is very poor

You have to show a graph in which you must show the number of publications, patents and startups in the area of nanoscience and nanotechnology

This will give readers the importance of the subject. I am very sad to note that there are no papers of 2024, 2023, 2022, and 2021.

All the important recent papers shodu be cited and discussed,

2) The section on the Lycurgus Cups is very interesting, but it could be enriched with more technical details on how the NPs contribute to the dichroic effect. Please show nice photos.

3) The mention of the 7:3 Ag-Au alloy NP with 10% Cu in the Lycurgus Cups is good but could be elaborated to explain the significance of this composition.

4) The paragraph discussing Richard Zsigmondy and Norio Taniguchi feels a bit disjointed. Perhaps integrate this information more smoothly with the preceding discussion on ancient NMs. All the Nobel Prize winners in the field of nanoscience and nanotechnology should be illustrated. The last Nobel Prize was

In the area of quantum dots.

5) The paper jumps from ancient to modern times and back again (e.g., from Feynman to ancient artifacts to Zsigmondy). Consider reorganizing the sections for better chronological flow or clearer thematic divisions.

6) Provide specific real-world examples to illustrate the applications and impacts of nanomaterials, which would make the content more engaging and relatable. Please show a large number of graphs, photos, and tables.
7) The discussion on the impact of nanomaterials on health and the environment should be expanded with more recent studies and data. This would strengthen the argument and provide a current perspective.
8) Discuss emerging trends in nanomaterial research, such as advancements in 2D materials, perovskite nanocrystals, or hybrid nanocomposites. Speculate on potential future applications or areas of growth based on current research trends.
9) While explaining the application of NMS in nanomedicine, there are several applications (antibacterial properties of silver NPs, uses of gold NPs in photothermal therapy, drug delivery, etc.), it could benefit from providing specific examples or case studies that illustrate these applications in practice. This would strengthen the technical understanding and provide concrete evidence of effectiveness. Also, provide more technical details on how each type of nanoparticle (e.g., gold NPs) achieves specific functionalities like drug delivery or bioimaging. Explain the mechanisms

involved, such as surface modification for targeting or the interaction of nanoparticles with biological systems.

How about tribo- and piezo-nanomaterials, very important fields. Please read the folljng paper.

https://www.sciencedirect.com/science/article/abs/pii/S2352507X23001099
10) When discussing the positive impact of NMs there mentioned the use of nanotechnology in aircraft for weight reduction and fuel efficiency, but it could be better to provide concrete examples or studies that demonstrate the actual benefits achieved (e.g., percentage reduction in weight, fuel savings).
11) While mentioning the negative impacts of NMs with biomolecules, body cells, and organisms, it would be beneficial to specify which types of nanomaterials are being discussed (e.g., metal nanoparticles, carbon-based nanomaterials) as different materials may have varying toxicity profiles.
12) Provide comparative analyses between different types of nanomaterials or between nanomaterial-based and traditional technologies. This helps in contextualizing the advantages or limitations of nanomaterial applications more effectively.
13) The conclusion was too brief , it could benefit from more specific recommendations or implications for future research, policy development, or technological advancements in the field of nanomaterials. Strengthening the section with more specific insights into future directions could enhance its impact and provide clearer

guidance for researchers in the field.

14) Overall it feels like the writing contains a significant amount of technical jargon. Consider simplifying the language or providing definitions to make it accessible to a broader audience.

15) Some sections are overly dense. Breaking them into smaller paragraphs or bullet points could improve readability.

16) While the manuscript covers a wide range of topics, there may be areas where deeper technical analysis or comparative studies could strengthen the discussion. For instance, providing more detailed mechanistic insights into how nanomaterials interacting with biological systems or comparing different production methods for their environmental impact could enhance the manuscrip's scientific rigor. Please read the review papers and books of Prof. Moungi Bawendi, Prof. Louis Brus, Prof. Aleksey Yekimov Prof. Nandakumar Kalarikkal et al, , Prof, Hanieh kargarzadeh et al, Prof. Robin Augustine et al.

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