

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

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Nisar Ali *et al.*, "Nanomaterials: History, Production, Properties, Applications, and Toxicities"

The present manuscript covers the main concepts of nanotechnology and the lingo related to it. The study presents a brief overview of the several categories of nanomaterials that can be utilised to provide catalytic activity that is both practical and inexpensive. According to projected trends, the study also examines the use of a number of unique approaches to improve the selectivity and sensitivity of metal oxide semiconductors. This study summarises the perspectives and outlook on upcoming developments in the field of metal oxide nanostructure research, as well as a thorough collection of the work done to date to address the challenges and current successes, highlighting the effects of nanotechnology on the environment and society.

The manuscript can be accepted after major revision. Authors should make the following corrections:

1. Subsection "Water treatment" (Page 6) missed a very important topic, namely, water purification from chlorobenzenes. I recommend Authors to refer to publications [Mishakov *et al.* *Water purification from chlorobenzenes using heteroatom-functionalized carbon nanofibers produced on self-organizing Ni-Pd catalyst*. Journal of Environmental Chemical Engineering, 2022, 10, 107873] and [One-pot functionalization of catalytically derived carbon nanostructures with heteroatoms for toxic-free environment. Applied Surface Science, 2022, 590, 153055].
2. Subsection "Sensors" (Page 6) missed some relevant references about materials for nanosensors for the control of air pollution, e.g., [Yalovega *et al.* *Influence of Cu/Sn mixture on the shape and structure of crystallites in copper-containing films: morphological and X-ray spectroscopy studies*. Applied Surface Science, 2016, 372, 93] and [Yalovega *et al.* *Mechanism of formation copper-containing fractal-like crystallites in metal-organic thin films: shape simulation and XANES analysis*. Physica Status Solidi B, 2016, 253, 2217] and references there. This subsection is very limited and missed a very important topic, namely, nanosensors based on carbon nanostructures for the control of air pollution. I recommend Authors to refer to publications [Rabchinskii *et al.* *Toward On-Chip Multisensor Arrays for Selective Methanol and Ethanol Detection at Room Temperature: Capitalizing the Graphene Carbonylation*. ACS Applied Materials & Interfaces, 2023, 15, 28370] and [Rabchinskii *et al.* *Guiding graphene derivatization for the on-chip multisensory arrays: From the synthesis to the theoretical background*. Advanced Materials Technologies, 2022, 7,

2101250] and references there.

3. The subsection “Energy storage” (Page 7) is very limited and missed a very important topic, namely, usage of carbon nanostructures for the energy storage applications. I recommend Authors to refer to publications [*New aspects in the study of carbon-hydrogen interaction in hydrogenated carbon nanotubes for energy storage applications*. Journal of Alloys and Compounds, 2019, 792, 713], [*Electronic Structure of Hydrogenated Carbon Nanotubes Studied by Core Level Spectroscopy*. Journal of Electron Spectroscopy and Related Phenomena, 2014, 196, 99], [*Hydrogenated carbon nanotubes: X-ray absorption spectroscopy and ab initio simulation analysis*. Journal of Physics: Conference Series, 2013, 430, 012025].
4. Subsection “Nano-medicine” (Page 7) missed some relevant references, e.g., [Pinakidou *et al.* *Addressing the effect of magnetic particle hyperthermia application on the composition and spatial distribution of iron oxide nanoparticles using X-ray spectroscopic techniques*. The Journal of Physical Chemistry C, 2022, 126, 10101].
5. In the last years, a novel carbon nanomaterial, namely, twisted multilayer graphene, has gained attention. I recommend Authors to refer to publications [*Engineering of numerous Moiré superlattices in twisted multilayer graphene for twistrionics and straintronics applications*. ACS Nano, 2021, 15, 12358] and [Kononenko *et al.* *Influence of numerous Moiré superlattices on transport properties of twisted multilayer graphene*. Carbon, 2022, 194, 52] and references there.
6. Authors missed a very important nanomaterial, “Carbyne.” I recommend Authors to refer to the publication [Controlled modification of polyvinylidene fluoride as a way for carbyne synthesis. Polymer Degradation and Stability, 2022, 203, 110054] and references there.
7. Typos should be corrected, e.g.:

Page 2, “developed carbon nanotubes” should be “observed carbon nanotubes”

Page 3, “creation of the carbon nanotubes” should be “observation of the carbon nanotubes”