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Impact of Size and Shape of ZnO Nanoparticles on Photocatalysis †

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Abstract: Zinc oxide is known to be a versatile material due to its idiosyncratic physical and chemical properties. Zinc oxide nanoparticles (ZnO NPs), extensively used in various fields as they are bio-compatible, show excellent piezoelectric properties, high photostability, economic and possess less toxicity. Along with fine photochemical stability, it also proved to have adequate antimicrobial efficiency. Therefore, as a cementitious material ZnO was found to be a promising operative building material under solar radiation, it tends to improve the hydrophobic nature and antimicrobial activity. The first part of this review will focus on the different methods to synthesize ZnO NPs along with the variation in shape and size of these ZnO NPs by adopting various physiochemical processes such as sol-gel processes co-precipitation, laser vaporization, microemulsion, etc. Such methods are not environment-safe since they use toxic chemicals as stabilizing agents, which can easily bind ZnO NPs and thus may restrain their biological applications. Thus, the green synthesis of these ZnO NPs has greatly drawn the attention of researchers in order to use alternative methods to develop these NPs with fewer adverse effects on environmental conditions and human health. Secondly, this review aims to evaluate variation in the properties of ZnO NPs and their toxicological effects. As a whole, this review is an attempt to comprise the influence of shape, size, and preparation methods on the photocatalytic activity and toxicological effects of ZnO NPs.

Keywords: zinc oxide; photocatalysis; nanoparticles; toxicology.

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Conflicts of Interest

The authors declare no conflict of interest.