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# Synthesis of hierarchical flower-like particles and its application as super-hydrophobic coating

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## Abstract:

Zinc oxide (ZnO) nanostructures present great potential for application in optical, sensing, and piezoelectric devices owing to their nanometric diameter and large specific surface area. To obtain well-designed and well-constructed ZnO micro/nano-architecture via a facile and inexpensive procedure is still a major challenge. Here, a sonochemical method was proposed for the synthesis of hierarchical flower-like polystyrene-ZnO micro/nano-particles (HFPs). Abundant thermal energy for the aqueous hydrothermal growth of ZnO nanorods (NRs) and sufficient ultrasonic irradiation to maintain the homogeneous dispersion of the particles produced were supplied by the sonochemical process. Moreover, the effects of precursor concentration, reaction time, and molar ratio of  $\text{Zn}(\text{NO}_3)_2$  to hexamethylenetetramine (HMT) on the synthesis of hierarchical flower-like particles were investigated. The mechanism of the hierarchical flower-like particle formation was presented, and the best morphology was obtained at a concentration of 25 mM  $\text{Zn}(\text{NO}_3)_2$  and 25 mM HMT with a reaction time of 2h. Finally, the potential of using HFPs as superhydrophilic or superhydrophobic coating was investigated to tailor the wettability of a surface.

**Key words:** zinc oxide; micro/nano-architecture; ultrasonics; superhydrophilic; superhydrophobic

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