Selective Synthesis of Single-Crystalline ZnO Nanostructures by a Sonochemical Route under Ambient Conditions

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Zinc oxide (ZnO) has been the topic of intensive investigations as a promising material for the fabrication of semiconductor nanostructures in recent years due to its wide direct energy bandgap of 3.37eV with large exciton binding energy (≈60meV). The general approach for synthesizing ZnO nanostructures is based on vapor phase reaction. While vapor phase synthesis methods can produce highly crystalline ZnO nanostructures, they require severe environmental conditions, such as high temperature and low pressure, by complicated vacuum and heating system. Therefore simple route to ZnO nanostructures under ambient conditions remained a great challenge until now. A sonochemical method has been recently investigated as a promising technique for the fabrication of ZnO nanostructures under ambient conditions. Therefore, we report the selective synthesis of highly single-crystalline ZnO nanostructures-nanorods, nanobowls, and nanosheets with sonochemical method. This research opens up possibilities to sonochemical approach for other ZnO nanostructures fabrication.