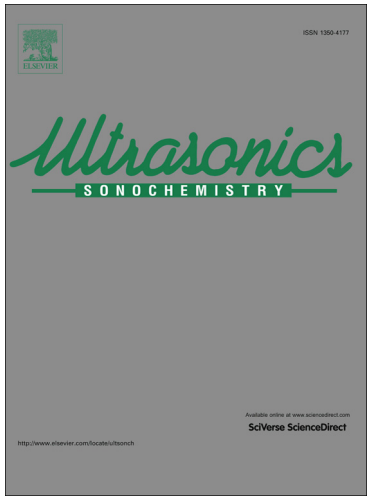

Sonochemical synthesis, formation mechanism, and solar cell application of tellurium nanoparticles

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Sonochemical synthesis, formation mechanism, and solar cell application of tellurium nanoparticles

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Abstract Tellurium inherently tends to form 1-D structures and while the 0-D Te nanostructures have better properties and applications in solar cell. In the present study, 0-D Te nanostructures including rice-like and spherical nanoparticles with the particle size of 15-40 nm were successfully synthesized via a facile sonochemical method. In the absence of ultrasonic irradiation nanorods were produced while performing the reaction under ultrasonic waves (at 200 W for 30 min) led to the formation of nanoparticles. Finally, the efficiency of various as-synthesized Te nanostructures in quantum dot-sensitized solar cells (QDSSCs) were evaluated. Using rice-like nanoparticles led to increase in J_{SC}, V_{OC}, FF and η parameters from 1.22, 0.54, 0.49 and 0.32% to 1.57, 0.64, 0.63 and 0.63%, respectively, compared with nanorods.

Keywords: Tellurium, Rice-like, Ultrasonic, QDSSCs