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Raman spectroscopy of ZnS nanoparticles

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Cubic ZnS nanoparticles were obtained by high-energy milling. Milling time was 5, 10 and 20 min. Weighted crystallite size ZnS nanoparticles and their separation depend on the milling time. The morphology of samples has been investigated by scanning electron microscopy (SEM), while structural characteristics were obtained by XRD powder technique. The crystallite size was calculated from XRD spectra by application of Scherrer's equation. The weighted crystallite size ZnS nanoparticles was estimated as 1.9 nm (after 5 min milling time), 2.3 nm (10 min) and 2.4 nm (20 min). The optical properties were studied by Raman spectroscopy. Raman scattering spectra were analyzed using a Lorentzian function and deconvolution of the spectra to the individual Lorentzian curves. The dominant structures in our spectra are at about 157, 263 and 345 cm⁻¹. That correspond to the second overtone of TA mode which originate from a zone boundary and TO and LO modes near the zone center, respectively. The theoretical model was used to calculate the relative contribution of the confined Raman scattering modes of the ZnS quantum dots. Satisfactory agreement with experimental results was obtained.

Biography

Nebojsa Romcevic is a Research Professor at Institute of Physics Belgrade, and Faculty of Electrical Engineering, Belgrade for Nanoscience and nanotechnology, and Innovation, technology transfer and intellectual property protection. He is the founder of Krystal infiz Ltd. innovative company that deals with technology and knowledge transfer from science to industry. His main scientific interest is an experimental work in the field of spectroscopy (Raman, X-Ray and FTIR) on semimagnetic semiconductors (bulk crystals, thin films and nanodimensional systems).

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