

Raman spectroscopy study on Cu₂ZnSnS₄-based nanocrystals and nanocomposites

Friday, 17 November 2023 14:15 (15 minutes)

The quaternary semiconductor Cu₂ZnSnS₄ (CZTS) and related compounds is a promising material for photovoltaic applications, thermoelectric and other applications related with alternative energy conversion and storage [1]. Significant research efforts have been made to obtain CZTS with superior structural quality, as well as the development of more efficient characterisation techniques for the detection of structural imperfections and impurity phases [2].

Here, we investigate the CZTS nanocrystals (NCs) obtained by a low-temperature "green" aqueous colloidal synthesis in the form of liquid "inks". Because most device applications require thin films with well defined parameters, we investigated CZTS NC films formed by drop-casting, spin- and spray-coating, with subsequent thermal or photonic annealing as simple, fast, and scalable fabrication methods. We demonstrate the possibilities of structural characterisation of such NCs, their heterostructures and NC/polymer composites by Raman spectroscopy. [2,3]

Topics

Session A. Physics of condensed matter and spectroscopy

Primary authors: KARNAUKHOV, Anatolii (V.Ye. Lashkaryov Institute of Semiconductor Physics of the NASU); VALAKH, Mykhailo (V. Lashkaryov Institute of Semiconductors Physics, National Academy of Sciences of Ukraine, Kyiv, Ukraine.); MAZUR, Nazar; SELYSHCHEV, Oleksandr (Semiconductor Physics, Chemnitz University of Technology, 09107 Chemnitz, Germany.); KAPUSH, Olga (Department of Optics and Spectroscopy, V. Lashkaryov Institute of Semiconductors Physics, National Academy of Sciences of Ukraine, Kyiv, Ukraine.); DZHAGAN, Volodymyr (V. Lashkaryov Institute of Semiconductors Physics, National Academy of Sciences of Ukraine, 03038 Kyiv, Ukraine); YUKHYMCHUK, Volodymyr; HAVRYLIUK, Yevhenii (Dr.)

Presenter: KARNAUKHOV, Anatolii (V.Ye. Lashkaryov Institute of Semiconductor Physics of the NASU)

Session Classification: Spectroscopy techniques and applications