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Ultrasonic characterization of co-additives effects on elastic moduli and acoustic properties of $Li_{1-x}Co_x Fe_2O_4$

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Acoustic microscopes can be used to measure Rayleigh and longitudinal wave speeds in a specimen at microscopic resolution. The wave speeds are obtained from the interference pattern as a function of the defocus distance or V(z) curve. The received signal voltage amplitude V is generated by two beams, the normally reflected central beam and a nonspecularly reflected beam that strikes the fluid-solid interface at critical angle. In this context, we derive novel analytical expressions for co-additives effects on E, G, Poisson ratio, ν, longitudinal velocity, (VL) and transverse velocity, (VS). Such effects are also put into evidence for both reflectance functions, R(θ) and acoustic signatures, V(z). The elastic properties of lithium cobalt mixed ferrites of different compositions from the experimentally and simulation observed that the values of longitudinal (VL) wave velocities vary form 5140 m/s to 6841 m/s whereas transverse velocities (VS) from 3084 m/s to 4105 m/s. Moreover, Young's (E) and bulk (n) moduli evaluated from the sound velocities as a function of cobalt doping and this moduli are increasing with increasing cobalt content. The Poisson's ratio for all the samples was centered about a value of 0.2. The variation of the elastic moduli with composition was interpreted in terms of the binding forces between the atoms.

Biography

Ibrahim Hamid Qassem AL-Suraihy is an Assistant Professor in Physics. He is working as Lecturer in the Faculty of Education, AL-Mahweet at Sana'a University. He has completed his Ph.D. at the age of 34 years from University of Badji Mokhtar Annaba, Algeria and master's degree in University Stuttgart, Germany. He is the head of Department of Physics in the Faculty of Education, AL-Mahweet at Sana'a University. He has published more than 5 papers in reputed journals.

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Electrochemically controlled release of molecular guests from redox responsive nanostructures and devices

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Stimuli responsive smart nanostructured systems are emerging as important candidates as platforms in various release systems e.g. in nanomedicine. Using external stimuli, enhanced control of the delivery of therapeutics in terms of release time, dosage and specificity of release location could enable a reduction of medicine dosage, control of the release profile, and a minimization of side effects. We report on the layer-by-layer (LBL) supramolecular assembly of redox responsive, organometallic poly(ferrocenylsilanes) (PFS) films on planar and porous substrates. Positively or negatively charged side groups render PFS water soluble and these polyelectrolytes also allow the use of electrostatic self-assembly process for the fabrication of novel functional supermolecular nanostructures. These multilayers respond to electrochemical stimuli and PFS can be re-dispersed in water by changing the oxidation state of Fe in the main chain. Moreover, PFS multilayers can be loaded with fluorescent guest molecules as model molecular payloads to study on release mechanism and kinetics. It will provide great opportunities in smart, stimuli-responsive delivery applications.

Biography

Jing Song earned her Ph.D. in Chemistry from University of Twente, The Netherlands in 2007. She then did postdoctoral work in the area of functional polymers in the same university. In 2010, she joined IMRE, an A*STAR research institute in Singapore. Her current research focus is on stimulus responsive polymers for biomedical applications.

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