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Synthesis and characterization of hollow microcapsules from bio-inspired crosslinkable polymers

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Highly uniform CaCO₃ microparticles were synthesized by two different methods to develop a cheaper procedure with greater control of the experimental variables. Co-polyelectrolytes containing vinylbenzyl thymine (VBT) and either vinylbenzyltriethylammonium chloride (VBA) or vinylphenylsulphonate (VPS) were used to form hollow microcapsules (MCs) via layer by layer (LbL) sequential adsorption on CaCO₃. The CaCO₃ sacrificial templates were removed later with EDTA solutions. CaCO₃ filled and hollow microcapsules were obtained after deposition of 3 alternated polyelectrolyte layers. Fluorescein dye was used for the FM visualization of the MCs, which were ~4.5 μm of average diameter. The removal of CaCO₃ by EDTA was monitored by Raman Spectroscopy (RS). The microparticles and microcapsules were characterized by Fluorescence Microscopy (FM), Scanning Electron Microscopy (SEM) and Atomic Force Microscopy (AFM). The effect on the microcapsules of the cyclobutane thymine dimmers formation upon UV irradiation (254 nm) was characterized by FM, SEM, AFM, and RS. The photo-crosslinking was monitored by RS through the formation of thymine dimmers, and observed by AFM and SEM. After UV irradiation the multilayer surface becomes rugged, suggesting that photo-curing of the shell controls the MCs morphology. These DNA-inspired copolyelectrolytes are promising materials for the development of LbL hollow microcapsules with several potential applications such as the stimuli or time controlled release of drugs and agrochemicals, enzyme occlusion, fabrication of enzymatic microreactors, etc.

Biography

D M Martino received her MSc and PhD in Physics from the University of Rosario, Argentina. She was a postdoctoral associate at the University of Massachusetts Boston, and later appointed as research scientist at the Francis Bitter Magnet Laboratory at MIT. She is currently a senior scientist at CONICET Argentina. She has published more than 50 papers in reputed journals; she is/was advisor of undergraduate, graduate and postdocs students, and PI of national and international founded grants. Her research interests include the application of magnetic resonance and optical spectroscopy to study the synthesis, characterization and modeling of new materials, in particular biopolymers.

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A study of the optical properties of Un-doped, potash and bamboo doped lead chloride (PbCl₂) crystals in silica gel

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The optical properties of un-doped, potash and bamboo doped lead chloride crystal (PbCl₂) have been studied by sol gel technique. The optical properties of the materials were determine using a JENWAY 6405 UV-VIS spectrophotometer operating at a wavelength range of 200 nm to 1200nm at an interval of 5nm. It was observed that the crystals are optically transparent. The average refracting index (n) ranged from 0.5 to 2.7. The band gap is from 2.8 to 3.6, showing that they are wide band gap materials and are good refractory materials for solid state, electronic and solar energy applications.

Biography

Don U V Okpala is a lecturer in the department of Industrial Physics, Anambra State University, Uli, Anambra State, Nigeria. He did his PhD research work on Synthesis and Characterization of Some Halides and Chalcogenide Crystals using Sol-Gel Method were he whittled down bulk African Materials into nano structures using top down approach and used them as dopants. He is the founder and Co-ordinator, Emeagwali Centre for Research, Renewable Energy and Materials Science, Anambra State University and Odumegwu Ojukwu Centre for Research and Development, Awka. He has authored more than 20 papers on reputable journals.

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