

Nanotek 2015 : Synthesis and characterization of strontium zinc oxide nano-composite via soft chemical process - Etakula Nagabhusan - Osmania University

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Nanostructured materials provide many benefits due to their enhanced properties, the promising applications of nanostructured materials have generated innovative method to synthesis new materials with high performance to enhance their use as Nano devices, Nano catalysts and Nano sensors. Although the use of Nano materials in industry is limited, their use in industry has already started and is expected to be extensive in the next few years. In the present study Strontium Zinc Oxide (SrZnO_2) Nanocomposite was synthesized by soft chemical approach by using Strontium Oxide with Zinc Oxide. Soft chemical approach helps for the synthesis of colloidal dispersion organic and inorganic materials at relatively low temperatures and with simple set up. The synthesis was carried out at moderate temperature 90°C and then finally dried in the laboratory oven at 100°C for 24 hours and then followed by calcination at 1000°C in a furnace with the heating rate of $5^\circ\text{C}/\text{min}$ for 6 hours to get a phase selective product. The concept of Soft chemical approach depends on the balanced synthesis-structural relationship based on electro negativity. Nanomaterials depict, on a basic level, materials of which a solitary unit little measured (in any event one measurement) somewhere in the range of 1 and 100 nm the typical meaning of nanoscale Nanomaterials research adopts a materials science-based strategy to nanotechnology, utilizing propels in materials metrology and combination which have been created on the side of microfabrication research. Materials with structure at the nanoscale frequently have one of a kind optical, electronic, or mechanical properties. Nanomaterials are gradually turning out to be commercialized and starting to develop as items. In ISO/TS 80004, nanomaterial is characterized as the "material with any outer measurement in the nanoscale or having inner structure or surface structure in the nanoscale", with nanoscale characterized as the "length extend around from 1 nm to 100 nm". This incorporates both nano-objects, which are discrete bits of material, and nanostructured materials, which have inside or surface structure on the nanoscale; a nanomaterial might be an individual from both these categories. On 18 October 2011, the European Commission received the accompanying meaning of a nanomaterial: "A

characteristic, coincidental or fabricated material containing particles, in an unbound state or as a total or as an agglomerate and for half or a greater amount of the particles in the number size circulation, at least one outer measurements is in the size range 1 nm – 100 nm. In explicit cases and where justified by worries for nature, wellbeing, security or intensity the number size dissemination limit of half might be supplanted by an edge between 1% to half. Built nanomaterials have been purposely designed and fabricated by people to have certain required properties. Inheritance nanomaterials are those that were in business creation preceding the improvement of nanotechnology as gradual headways over other colloidal or particulate materials. They incorporate carbon dark and titanium dioxide nanoparticles. Nanomaterials might be by chance delivered as a side-effect of mechanical or modern procedures. Wellsprings of coincidental nanoparticles incorporate vehicle motor debilitates, welding exhaust, ignition forms from household strong fuel warming and cooking. For example, the class of nanomaterials called fullerenes are created by consuming gas, biomass, and candle. It can likewise be a side-effect of wear and erosion products. Incidental barometrical nanoparticles are frequently alluded to as ultrafine particles, which are accidentally delivered during a deliberate activity, and could add to air contamination. Organic frameworks frequently include characteristic, useful nanomaterials. The structure of foraminifera (chiefly chalk) and infections (protein, capsid), the wax precious stones covering a lotus or nasturtium leaf, creepy crawly and bug vermin silk, the blue tint of tarantulas, the "spatulae" on the base of gecko feet, some butterfly wing scales, common colloids (milk, blood), horny materials (skin, hooks, mouths, plumes, horns, hair), paper, cotton, nacre, corals, and even our own bone network are for the most part characteristic natural nanomaterials. Common inorganic nanomaterials happen through gem development in the different substance states of the Earth's covering. For instance, dirt shows complex nanostructures because of anisotropy of their hidden precious stone structure, and volcanic action can offer ascent to opals, which are an example of a normally happening photonic gems due to their nanoscale structure. Flames speak to especially

complex responses and can create colors, concrete, smoldered silica and so forth. Nano-objects are regularly classified regarding what number of their measurements fall in the nanoscale. A nanoparticle is characterized a nano-object with every one of the three outer measurements in the nanoscale, whose longest and the most brief tomahawks don't vary essentially. A nanofiber has two outside measurements in the nanoscale, with nanotubes being empty nanofibers and nanorods being strong nanofibers. A nanoplate has one outer measurement in the nanoscale, and if the two bigger measurements are fundamentally unique it is known as a nanoribbon. For nanofibers and nanoplates, different measurements could conceivably be in the nanoscale, however should be essentially bigger. A critical diverse in all cases is noted to be regularly at any rate a factor of 3. Nanostructured materials are regularly classified by what periods of issue they contain. A nanocomposite is a strong containing in any event one genuinely or artificially unmistakable locale, or assortment of districts, having at any rate one measurement in the nanoscale.. A nanofoam has a fluid or strong framework, loaded up with a vaporous stage, where one of the two stages has measurements on the nanoscale. A nanoporous material is a strong material containing nanopores, holes with measurements on the nanoscale. A nanocrystalline material has a noteworthy division of precious stone grains in the nanoscale. In different sources, nanoporous materials and nanofoam are some of the time considered nanostructures however not nanomaterials on the grounds that solitary the voids and not simply the materials are nanoscale. Although

the ISO definition just considers round nano-articles to be nanoparticles, different sources utilize the term nanoparticle for all shapes. Normal wellsprings of nanoparticles incorporate burning items backwoods fires, volcanic debris, sea shower, and the radioactive rot of radon gas. Normal nanomaterials can likewise be shaped through enduring procedures of metal-or anion-containing rocks, just as at corrosive mine waste locales. The structure, morphology and properties of the particles were characterized by XRD, SEM and FT-IR. The mean particle size was calculated by using X-ray diffraction pattern by using Scherer's Equation, $t=0.9\lambda/B \cos\Theta$. The results obtained from different characterization techniques showed that nanostructured materials where formed with small sizes of particles, with good crystallinity and clean environment which can be used for appropriate technologies like Nano devices, Nano catalysts, Nano sensors, etc.

Biography

Etakula Nagabhushan has completed his PhD from Osmania University. He completed his B-Tech in Chemical Engineering and M-Tech in Ceramic Engineering from Osmania University, India. He has guided about 30 M-Tech theses. He has 25 years of teaching and research experience. Presently, he is the Professor and Head, Dept. of Ceramic Engineering & Materials Science Technology, Osmania University. His areas of interest are ceramics, polymers and nano-materials.

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