

Sonochemically Synthesized LaPO₄ Nanopowder and Its Catalytic Activity

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Up to now, some procedures have been developed for the synthesis of LaPO₄ salt, in the nano-scale,^[1] and we report here the preparation of LaPO₄ nanoparticles under ultrasonic irradiation by using La(NO₃)₃·6H₂O and NaH₂PO₄·2H₂O in water/ethylene glycol. The morphology and average particle size were studied by SEM-EDX and XRD. The SEM image showed uniformity in morphology of the prepared LaPO₄ (Fig. 1), and the existence of lanthanum, phosphorous, and oxygen atoms were confirmed by SEM-EDX analysis. XRD pattern of sample is in agreement with monoclinic system of the LaPO₄ in *P*₂₁/*n* space group (JCPDS 32-0493). The average grain size, of 41 nm, was calculated by using Scherrer equation. The synthetic lanthanum phosphate was used as a new heterogeneous and highly useful nano-catalyst for the synthesis of 3-(4-nitrophenyl)-1-phenyl-3-(phenylthio)propan-1-one from the conjugate addition of thiophenol to *p*-nitrochalcone. The product was characterized by single-crystal X-ray determination (Fig. 2), IR, ¹HNMR, ¹³CNMR, elemental analysis and mass spectrometry. The low solubility of LaPO₄ salt in water and its high thermal stability^[2] make it as a good candidate in catalytic applications.^[3] Moreover, due to the presence of PO₄³⁻, the La³⁺ ion is oxophilic enough to form a strong coordinate bond with the oxygen atom in a carbonyl compound. This is a suitable characteristic to activate C_β in the α,β-unsaturated ketones giving the sufficiently electrophilic property required in the conjugate addition considered in this work.

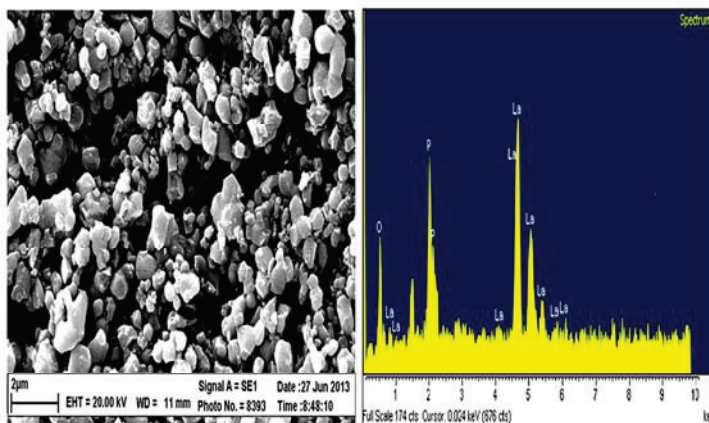


Fig. 1.

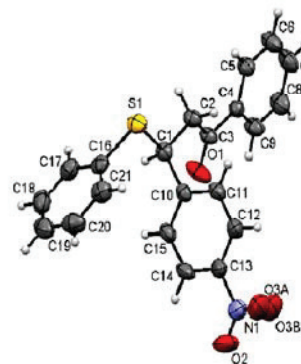


Fig. 2.

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