# $In_2O_3$ Nanobouquets

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**Abstract—**In this study, $In_2O_3$ nanobouquets were synthesized successfully on n-type Si substrate using VLS (Vapor-Liquid-Solid) technique at the temperature of 900°C. We used $In_2O_3$ powder as the source material, Au as the catalyst, Ar as the carrier gas. We also used active carbon as the catalytic reactant in this study. XRD, SEM and PL techniques were used to make comparative studies of nanostructures. The composition of the nanostructures was determined by EDX. The obtained experimental results were compared with other experimental results and theoretical values and it was found that there is a good agreement.

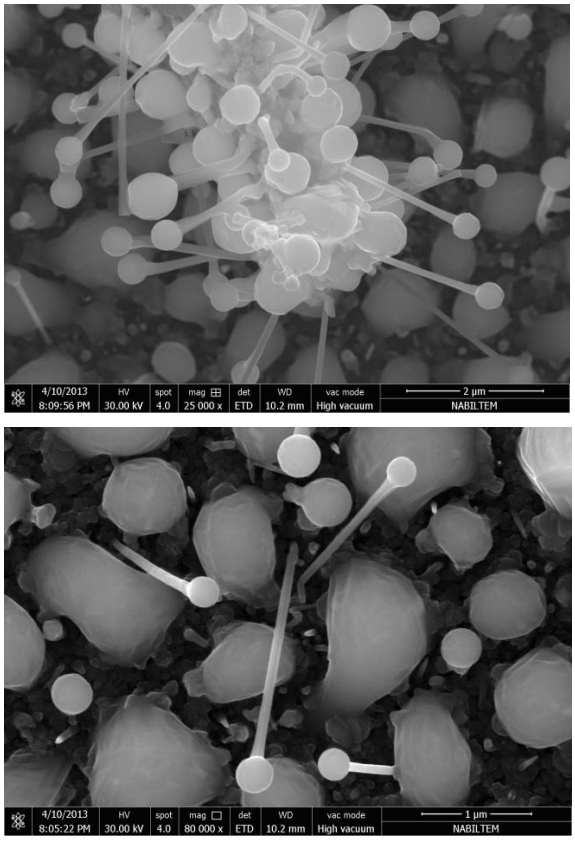



Figure-1: SEM images of $In_2O_3$ nanobouquets.

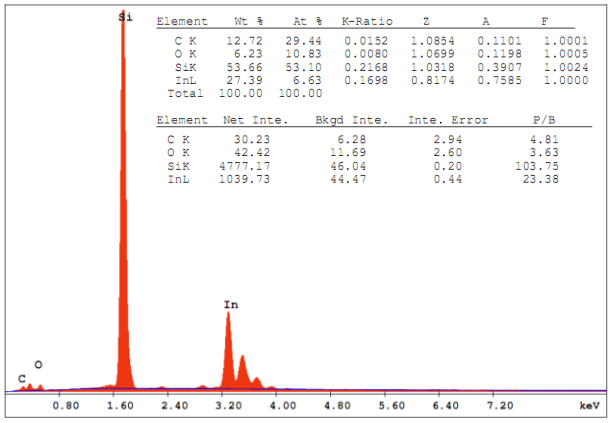



Figure-2: EDX spectra indicates the elemental In, O, C and Si distribution in the $In_2O_3$ nanobouquets.

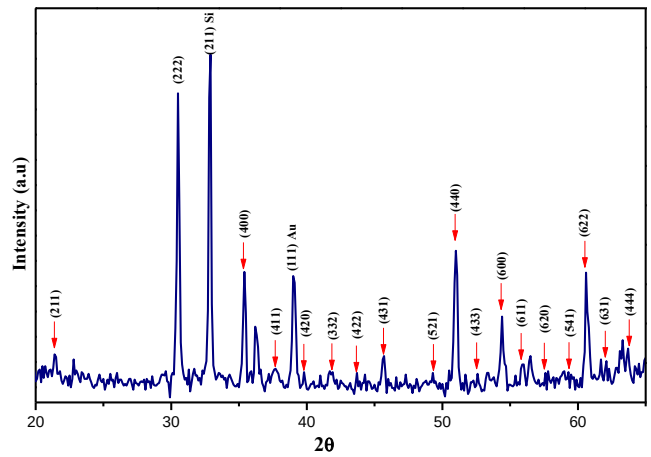



Figure-3: XRD patterns of $In_2O_3$ nanobouquets.

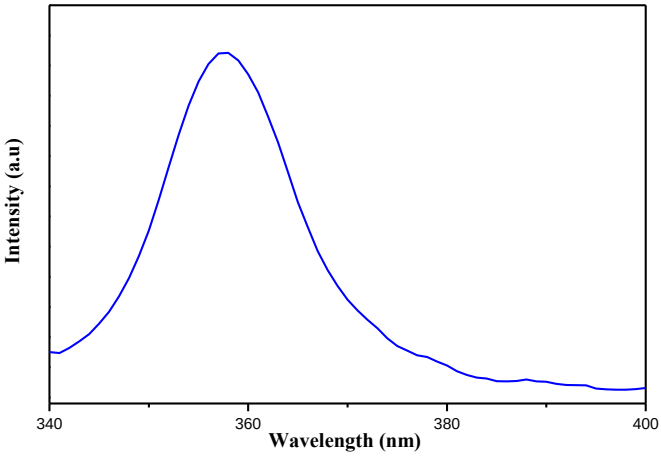



Figure-4: Photoluminescence (PL) spectrum of $In_2O_3$ nanobouquets at room temperature.

In this study, a certain amount of $In_2O_3$ and C was mixed as the source material. The main reason of the morphology differences observed through the scanning electron microscopy is C (Fig. 1). By analyzing compositions of $In_2O_3$ nanobouquets with energy-dispersive X-ray spectrometer, we found carbon element, as well as oxygen and indium elements (Fig. 2). Fig. 3 shows the X-ray diffraction pattern and its Miller indices at each diffraction peak. All the observed peaks can be perfectly indexed to the crystal planes of the cubic (JPDS card no. 06-0416). Wide UV emission bands centered at 358 nm (3.46 eV) are observed by photoluminescence measurements (Fig. 4).

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