

## **The impact of nanoclay on the crystal growth kinetics and morphology of biodegradable poly(ethylene succinate) composite**

Jayita Bandyopadhyay <sup>a</sup>, Suprakas Sinha Ray <sup>a,b,\*</sup>, Manfred Scriba <sup>a</sup>, Thomas Malwela <sup>a</sup>

<sup>a</sup> DST/CSIR Nanotechnology Innovation Centre, National Centre for Nano-Structured Materials, Council for Scientific and Industrial Research, Pretoria 0001, South Africa

<sup>b</sup> Department of Chemical Technology, University of Johannesburg, Doornfontein 2018, Johannesburg, South Africa

### **Abstract**

The impact of nanoclay on the isothermal crystal growth kinetics and morphology of biodegradable poly(ethylene succinate) (PES) is reported. A PES composite (PESNC) containing 5 wt% organically modified montmorillonite, was prepared via solvent casting method. The structural study of PESNC, using X-ray diffraction and optical microscope, showed the formation of micro-intercalated composite. The isothermal crystallization behavior of neat PES and PESNC was studied by differential scanning calorimetry, polarized optical and atomic force microscopes. Results show that the supercooling effect of neat PES reduces after composite formation. The Lauritzen-Hoffman secondary nucleation theory (the LH-model) was employed to understand the crystal growth mechanism of these systems. According to the LH-model, only one transition between regime II and regime III was found, but no transition from regime I to II was detected.