

Luminescent thin films based on expanded polystyrene recovery

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Expanded polystyrene (EPS) is inexpensive, lightweight, long-lasting and non-economically attractive to be recycled. There exist challenges inherent in conventional recycling routes of EPS (i.e. incineration and extrusion) and the recovered outcome usually stems to limited applications in engineering.¹ We took advantage of the high solubility of polystyrene in D-limonene², a green solvent presents as major component of citrus oil, to prepare optical materials through environmental-friendly recycle processing of EPS waste. We successfully prepared transparent (> 90 %) and luminescent thin films by spin-coating a solution prepared by dissolving EPS pack wastes and luminescent red emitting Eu³⁺ β -diketonate complex³ (Figure 1). The obtained films were characterized by vibrational infrared spectroscopy (FTIR), photoluminescence spectroscopy, M-Lines spectroscopy and ultraviolet-visible spectrophotometry (UV-Vis) techniques. The incorporation of Eu³⁺ β -diketonate complex in EPS recovered matrix did not place deleterious effect on the optical properties comparing to pure complex. Beyond that, luminescent EPS films hold rich potential as waveguides materials. Remarkably, the feasible green route of fabrication herein reported paves way on the rational design of high quality optical materials from non-attractive recyclable plastics.

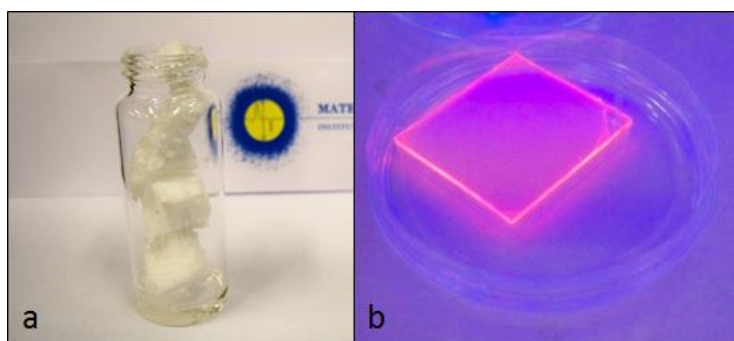


Figure 1 - EPS dissolution (a) and PS-Eu film under 365 nm light excitation (b).

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