

## Organic conductor: Influence of preparation temperature

### ABSTRACT

The conducting polypyrrole–polyethylene glycol (PPy–PEG) composite films were produced at various polymerization temperature ranging from 5 °C to 60°C using  $1 \times 10^{-3}$  M PEG, 0.20M pyrrole and 0.10M p-toluene sulfonate at 1.20V (vs. SCE). The polymerization temperature of 5 °C appeared as the optimum preparation temperature showing the highest electrical conductivity of 70 S/cm and the thermal diffusivity of  $8.76 \times 10^{-7} \text{m}^2 \text{s}^{-1}$ . The electrical conductivity and thermal diffusivity exhibited a decreasing trend with the increase in polymerization temperature in the pyrrole solution used to prepare the composite films. The XRD results reveal that low temperature (5 °C) typically results in more crystalline films, which are denser, stronger and have higher conductivity. The optical microscopy of PPy–PEG shows the globular surface morphology. The surface of the of the solution side of PPy–PEG film prepared at low temperatures showed a globular morphology.

**Keyword:** Polypyrrole, Polyethylene glycol, Thermal diffusivity, Electrical conductivity  
Dopant