

ABSTRACT

Intrinsic conducting polypyrrole nanoparticles were prepared using a mixed surfactant system in an micro-emulsion polymerization process. The surfactant system contains anionic SDS and nonionic type peo/ppo (DP-30). The Ppy/Al₂O₃/Al solid capacitors were subsequently assembled using Ppy as the conduction electrolyte, and their electric characteristics were investigated.

The Ppy particles were chemically polymerized in water using two different kinds of oxidizing agents in different concentrations. Properties of these particles, including the particle size, the thermal decomposing temperature and the concentration of ions from Ferric Chloride were characterized. The sizes of the particle obtained were about 60 nm. Residual ions of iron and chlorine in the particle were 0.24(g Fe/g ppy partcile) and 0.38(g Cl/g ppy partcile), respectively. The fastest thermal decomposition occurred at a temperature of 256°C, as indicated by TGA data.

Three different kinds of binders for Ppy electrolyte, namely PVDF、CMC and gelatin, were tested in the capacitor systems. Effects of the binders on the electric properties of the capacitors, including the equivalent circuit capacity, resistance, impedance, loss current, and the loss coefficient, were measured. Our results showed that the system synthesized with PVDF has the highest capacity at 48.7nF cm⁻², but it also has the lowest resistance at 2.356x10⁶ohm. Loss current, in this case,

could exceed the allowable standard.