HYDROPHILIC RADICAL POLYMER ELECTRODE-BASED SECONDARY BATTERY: GC COMPATIBILITY EVALUATION

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Demand for Li-ion battery and other secondary batteries is expanded for portable electronic devices. Safety and environment-compatibility have been also paid much attention as a battery performance, because of overheating and ignition accidents. Organic electrode-active materials using radical polymer have been studied to develop an organic-based secondary battery as a potential alternative to inorganic- or metal-based batteries.[1] Usage of the radical polymer in additional combination with aqueous electrolyte could reduce ignition risk.

In this paper, poly(2,2,6,6-tetramethylpiperidinyloxy acrylamide) (PTAm) was synthesized as a hydrophilic radical polymer to compose aqueous electrolyte-type radical polymer battery. PTAm displayed a reversible redox wave at 0.7 V (vs. Ag/AgCl) with narrow peak-to-peak separation (ΔE = 19 mV), indicating fast and reversible electron diffusion within the PTAm layer in aqueous electrolyte. A test cell was fabricated by the PTAm cathode, zinc anode, and aqueous electrolyte. Charge-discharge curves for the fabricated cell gave a plateau voltage at 1.68 V vs. $Zn/Zn^{2+}$and quantitative charge/discharge capacity.

GC compatibility of this battery will be discussed from the view point of environmental impact, safety impact and socio-economic impact.

[1] H. Nishide, K. Oyaizu, *Science*, 319, 737-738 (2008)