Short Communication

Lithium Intercalation into Graphene Ribbons of Glassy Carbon

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doi: 10.20964/2017.02.48

Received: 7 November 2016 / Accepted: 22 December 2016 / Published: 30 December 2016

The lithium intercalation into a glassy carbon (GC) electrode, which is a partially graphitized carbon with a turbostratic structure, during the electrodeposition of lithium at the GC electrode in propylene carbonate (PC) solution containing 0.1 M LiClO₄ and the lithium deintercalation from the GC electrode were investigated by X-ray photoelectron spectroscopy (XPS), X-ray diffraction (XRD) technique and cyclic voltammetry (CV). The formation of lithium graphite intercalation compounds (LiC_{6n}) was confirmed by XPS and XRD measurements. The (002) Bragg peak for the Li-electrodeposited GC powder shifted to a smaller scattering angle (2 θ) compared with that for the GC powder, i.e., 2 θ = 25.1 and 21.2° which gave the interlayer spacing (d) of 3.54 and 4.19 Å, respectively, for the GC and Li-electrodeposited GC powders, giving a direct evidence of the lithium intercalation into graphene ribbons of the GC. The lithium intercalation / deintercalation behavior was considered to be reflected on the CVs obtained for the reduction / oxidation process observed at the GC electrode. Based on the results obtained, it was also suggested that the insertion / deinsertion to / from the cavities such as microvoids (pores) of the GC electrode substrate may take place along with the lithium intercalation / deintercalation into / from the graphene ribbon layers.

Keywords: Lithium electrodeposition; Intercalation; Glassy carbon; Graphene ribbon

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