Surfactant Effect as Template Agent on the Morphological and Electrochemical Properties of V$_2$O$_5$

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The effect of the release of cetylpyridinium chloride surfactant into the V$_2$O$_5$ following the behavior of lithium intercalation into an electrode containing the V$_2$O$_5$ film has been investigated. X-ray diffraction patterns indicated formation of a lamellar structure. After the calcination and release of surfactant occurred the formation of an orthorhombic structure. Scanning Electronic Microscopy shows that the route employed for the preparation of an open network V$_2$O$_5$ structure was successful. The electrochemical performance of the open network structured material compared with a compact structure of V$_2$O$_5$, via sol-gel route as lithium intercalation cathode materials were evaluated. The open network material reaches stability more easily and presents a high total voltammetric charge after several cycles compared with the V$_2$O$_5$ xerogel. Lithium intercalation into the V$_2$O$_5$ electrode is very influenced by open network surface and surface irregularity, in contrast with the compact surface of the V$_2$O$_5$ xerogel.

Keywords: Intercalation reaction; V$_2$O$_5$ xerogel; open network; surfactant; electrochemical studies

FULL TEXT

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