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FURTHER OPTIMIZING THE MICROSTRUCTURE OF TITANIA NANOTUBE FOR SODIUM BATTERIES.

José Ramón González Jiménez[a], Francisco Nacimiento Cobos[a], Ricardo Alcántara Román[a], Gregorio Ortiz Jiménez[a], Pedro Lavela Cabello[a], José Luis Tirado Coello[a], Ekaterina Zhecheva[b], Radostina Stoyanova[b].

[a]Laboratorio de Química Inorgánica, Campus de Rabanales, Universidad de Córdoba, 14071 Córdoba (Spain).

[b]Institute of General and Inorganic Chemistry, Bulgarian Academy of Sciences, 1113 Sofia (Bulgaria).

e-mail: q92nacof@uco.es

Self-organized titania (TiO_2) nanotubes can be prepared by anodization of titanium.[1-4] The resulting nanotubes nt-TiO_2 can used like electrode materials in batteries or microbatteries. Sodium can be an alternative to lithium batteries because of economical and environmental reasons, and a future "post-lithium era" is being envisaged.

We have found that nt-TiO_2 prepared under carefully tailored conditions can react reversibly with sodium ions in both non-aqueous[1,2,4] and aqueous[3] solutions. Thus, the nanotube structure comprising two concentric nanotubes is particularly useful to achieve high values of specific capacity.[3,4] In comparison with bulk TiO_2, this special morphology enhances the surface of nt-TiO_2 which is in contact with the electrolyte solution, allows rapid penetration of sodium ions in the electrode and favors the contribution of the pseudocapacitive processes to the total capacity of the electrode.

In this communication we show new insights about the reaction between alkali metals and nt-TiO_2, and the roles which are played by "true" intercalation and pseudocapacitance mechanisms are revised.

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