SnO_2 and TiO_2 / graphene oxide composites for applications in Li-ion batteries

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Materials for lithium-ion battery (LIB) applications have become the topic for intensive research. Several oxide-based materials have been studied such as the graphitic carbons as anodes which are limited by a low theoretical capacity about 372 mAh·g-1, and electrochemically active metal oxides CuO, SnO_2, Fe3O4 or Co_3O_4 with high theoretical capacities ~1000 mAh·g-1. One disadvantage is a large volume expansion and particle agglomeration during the lithiation/delithiation processes that lead to rapid degradation of the battery. Herein, we report the study of SnO_2 and TiO_2 nanoparticles and their composites with graphene oxide (GO) for applications as anodes in Li-ion batteries. Two chemical routes were used for the synthesis of nanoparticles in order to check its stability and effectiveness. One is the sol-gel method and the other one is the hydrolysis method. Capacity-cycle and capacity-voltage measurements have been performed in a coin cell type. SnO_2 batteries show a high capacity in the charge/discharge process up to 100 cycles; however, TiO_2 nanoparticles reveals a large stability in capacity terms up to 200 cycles, and finally an intermediate capacity for the GO/SnO_2 composite that remains stable still in the 200th cycle, that can be used as a promising alternative anode material for LIBs.

Speaker Biography

Julio Ramirez-Castellanos works in the synthesis and structural/microstructural characterizations of new functional inorganic materials by high-resolution electron microscopy. Currently, he is professor at Complutense University, Madrid. He is co-author of more than 100 reviewed scientific publications, 4 invention patents, and more than 100 communications to international conferences.

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