Doping-induced improvement of the electrochemical performance Fe_2O_3-based anodes for rechargeable sodium ion batteries

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The increasing demand of energy and the need to limit global warming and climate changes is increasingly promoting the use of sustainable, environmentally friendly renewable energy sources. On turn, these new policies are driving the research activity towards the development of high efficiency large-scale energy storage systems (ESSs) to be integrated in stationary power units and smart electric grids. The search for cost-effective materials allowing improving power density, cyclability and round-trip efficiency is a key point both for more mature ESSs, such as redox flow batteries, and for the newer, developing ones, such as post-lithium batteries. In this scenery, rechargeable batteries exploiting sodium-ion storage, even if not commercialized at the large scale yet, probably represent the technology with the highest level of maturity and sustainability [1]. Presently, great efforts are focused on the development of highly performing nanostructured anode materials. Among them, iron oxides, such as Fe_2O_3, exhibit high theoretical reversible capacities and low cost, but the low conductivity limits their performance in rechargeable batteries.

This contribution reports on the doping-induced improvement of the electrochemical performance Fe_2O_3-based anodes for rechargeable sodium ion batteries (SIBs). The changes produced by doping with tetravalent impurities (Ge^{4+}, Si^{4+} or Ti^{4+}) in the material properties is demonstrated in the case of Fe_2O_3/reduced graphene oxide composites produced by solvothermal method [2] and for electrospun Fe_2O_3-based nanofibers [3,4].

References

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