New trends on environmentally sound processes for the synthesis of nanoparticles by chemical methods

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Abstract

In this brief survey, we deal with green processes concerning the synthesis of zerovalent nanoparticles, enlightening some aspects motivating their choice with respect to traditional techniques generally relying upon toxic or noxious reactants and stabilizing agents. After a short discussion about health and environmental safety related to the use of standard reductants, we run through several green methods for metal nanoparticle synthesis and we split them into two basic classes, according to the electropositivity of the elements which the nanoparticles are made of. This classification has been proposed in order to account for strengths and weaknesses of processes based on active substances of biological origin that, though being effective in the production of noble metal nanoparticles, proved to be much less suitable when tested in the synthesis of nanoparticles made of more electropositive elements. The goal of this work is essentially oriented to stimulating new research trends for the eco-friendly production of nanosized non-noble elements deserving more attention by current nanobiotechnology.