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Nanomaterials synthesized by electrochemical discharges: qualitative and quantitative performance ANIS ALLAGUI, ROLF WUTHRICH, Concordia University — During the electrochemical discharges in aqueous solutions, the electronic avalanches induce several reactions of dimerization and recombination of the hydrated electrons and H* and OH* radicals, generated by the radiation of water molecules. With the introduction of metallic ions M^{z+}, the successful manufacture of nanoparticles is controlled by the continuous competition of reduction of M^{z+}, by the powerful reducing agents e_H^- and H* to lower levels of valency, and the back reaction of oxidation by OH*. With the assumption that the concentration of metal ions is high enough when compared to those of species e_H^-, H* and OH*, the differential yield G between the formation and consumption of M^{z+} in a given finite volume around the electron-emitting electrode is modeled by homogeneous kinetics. It is found G to be proportional to the concentration of metal ions, the speed and penetration depth of the electrons, and the ratio of rate constants of reactions of nucleation and polymerization, which are supported by previous contributions on the dynamics and stability of the phenomenon.

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