Cathodic corrosion – a quick, clean and versatile method for the synthesis of metallic nanoparticles

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One of the most efficient ways to inhibit the corrosion of a metal submerged into an electrolyte is cathodic protection. By applying a sufficiently negative potential the oxidation reaction is made thermodynamically unfavourable and corrosion effectively stops. Remarkably, we show here that if this protective potential is made sufficiently negative, the metal surface is rapidly corroded into an agglomeration of metallic nanoparticles. Apart from posing the fundamental challenge of understanding chemistry at very negative potentials, cathodic corrosion opens a new and extremely simple route towards the synthesis of clean metallic nanoparticles. On the example of platinum we demonstrate that these nanoparticles have superior catalytic activity towards oxidation of carbon monoxide as well as small alcohols when compared to the state-of-the-art commercial catalysts.