SI MICRO- /NANO- RODS WITH TUNABLE SHAPES AND SIZES BY CHEMICAL ETCHING METHODS FOR BIOLOGICAL APPLICATIONS

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Particles with low dimensionality are increasingly attracting the attention of global research groups with regard to possible biological and medical applications, like drug delivery. Different materials have been tested. Among them, Si receives special attention because it is an abundant and biocompatible material, and there are many techniques to process it since the microelectronics world is based on it.

The electrochemical production of low dimensional Si particles is one of the most commonly used for bio- applications, since it is much cheaper and allows higher yields than physical or chemical deposition methods. The most common approach is to pulverize nanoporous Si by ion milling or ultrasonication. On the other hand, an improved electrochemical process for producing Si micro- and nano- rods with monodispersed sizes and shapes is the SiPaKi (Silicon Particles Kiel) method. It consists of two main steps: (1) Electrochemical etching of macropores in Si. Pores with periodical diameter bulges are produced. The distance between bulges corresponds to the length of the final particles. (2) Chemical etching of the macroporous Si. Pore diameters increase until the pore walls collapse at the bulges, leaving the desired micro- or nano- rods behind.

In the present work a modified SiPaKi method is presented, where the main etching processes are all chemical. Once the particles are obtained, they can be further porosified or shaped by additional chemical etching steps, according to the application: drug delivery, cell culture, cell adhesion, etc.

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