

I.11. Electrochemical Engineering of Semiconductor Porous Templates and Nanowire Arrays: Control of the Shape and Growth Direction

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Nowadays electrochemical methods present a viable alternative, offering a more accessible and flexible approach to design and fabricate semiconductor nanostructures. This work will cover the development of semiconductor porous structures through electrochemical etching of semiconductor substrates [1]. It will highlight how the combination of the photolithography and electrochemical etching, using photoresist masks and subsequent anodization, enables the possibilities to control the pore growth direction [2,3]. This approach facilitates the creation of porous domains with different shapes, offering enhanced control over material properties and broader application possibilities.

It will be discussed the transition from porous structures to networks of semiconductor nanowires obtained through electrochemical etching, possessing higher quality compared to those grown by other techniques [4]. Moreover, the shape as well as the growth direction of the nanowires can be controlled by selecting the crystallographic orientation of the semiconductor substrate used in the anodization process [5]. This control over structural formation enhances the potential for developing hybrid metal-semiconductor structures with tailored properties.

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