Qeios

Peer Review

Review of: "A useful flat substrate for bonding nanowires and for biological applications, Si (silicon wafer) has glass-like properties and can be used to mount or grow nanowire particles"

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Silicon wafer substrates can be used for sample substrates, microfabrication, substrates for nanowires, or biological substrates. A useful flat substrate for bonding nanowires and for biological applications, Si (silicon wafer) has glass-like properties and can be used to mount or grow nanowire particles. It can be easily cleaned or used as an entire wafer for nanowire propagation. Silicon nanowire arrays, or SiNWs, are vertical arrays of silicon nanowires on a planar crystalline silicon wafer substrate. These nanowires are fabricated by a catalytic oxidation and dissolution of Si in the presence of metal catalyst nanoparticles - a self-organized process commonly known as the metal-chemical enhanced process with the aid of silicon wafers .

Silicon nanowires are one of the best examples of semiconductor nanostructures that can be fabricated as single crystals with a diameter of 9–10 nm. SiNWs have high mobility and a high surface-to-volume ratio, which makes them easy to control using a weak electric field. The process of growing nanowires on silicon wafers makes Si nanowire arrays more reproducible and uniform, and allows the properties of the nanowires to be tuned. The process of growing nanowires always involves the deposition of a metal and bonding in a solution containing hydrofluoric acid (HF) and an oxidant. Silicon is only formed where the metal nanoparticles touch the silicon, resulting in electrochemical

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reactions involving nanoparticles that move into the resulting nanowires. Since the silicon is only locally doped, this process can lead to very high aspect ratio features in the nanowires.

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Declarations

Potential competing interests: No potential competing interests to declare.