

Synthesis of porous silicon by ion implantation

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Abstract

© 2015 Advanced Study Center Co. Ltd. Porous materials have attracted remarkable concerns and found tremendous importance widespread in both fundamental research and industrial applications. Such materials could be widely used for variety applications as absorbents, lightings, catalysts, and for biological molecular filtration and isolation. One quite known method for preparation of porous semiconductor structures is ion implantation, which was successfully used to create porous germanium layers by Ge⁺-, Bi⁺- and Sn⁺-ion irradiation of crystalline germanium substrates. It was also shown that ion implantation suited to produce porous structures in amorphous germanium and SiGe (90% of germanium) alloys thin films. Ion implantation is a well established and all over the world accessible technique, being mainly used for semiconductor microelectronic device fabrication. Unfortunately, a possibility about porous silicon (PSi) fabrication using ion implantation was not completely studied now. At the present report a novel technological approach based on low-energy ion implantation is suggested and realized to create PSi layers on the crystalline surface of Si wafers. It is demonstrated that using high-dose (more than 1.0×10^{16} ion/cm²) Ag-ion implantation of silicon with the energy of 30 keV the surface PSi structures with nanoparticles can be successfully fabricated.
