

Functionalization of porous silicon surfaces through hydrosilylation reactions. Buriak, J. M.; Stewart, M. P.; Allen, M. J.. Department of Chemistry, Purdue University, West Lafayette, IN, USA. Materials Research Society Symposium Proceedings (1999), 536(Microcrystalline and Nanocrystalline Semiconductors--1998), 173-178. Publisher: Materials Research Society, ISSN: 0272-9172.

Abstract

Hydrosilylation of alkynes and alkenes on silicon surfaces utilizing the native Si-H termination can be smoothly and rapidly carried out (30 s to 24 h) at room temp. through hydrosilylation mediated by Lewis acid catalysts or photoinduction with white light. Insertion of alkynes and alkenes into surface silicon hydride bonds yields covalently bound alkenyl and alkyl groups, resp. Different chem. functionalities can be incorporated through these hydrosilylation reactions, including ester, hydroxy, chloro, nitrile and chiral groups. Hydrophobic porous silicon surfaces demonstrate remarkable stability with respect to boiling aq. aerated pH 1 to 10 solns., and protect the bulk silicon from attack. Modification and tailoring of surface properties through this series of reactions induce wide variations in photoluminescent behavior of porous silicon, leading to almost complete quenching in the case of substituted and unsubstituted styrenyl termination, and minor decreases for alkyl and alkenyl functionalization. Because of the broad range of stable, modified surfaces produced using this chem., the work described here represents an important step towards technol. applications of silicon surfaces.