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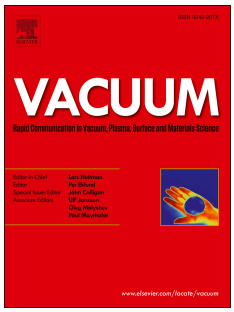

Theoretical investigation of crystallographic orientation effect on the chemical etching rate

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Theoretical investigation of crystallographic orientation effect on the chemical etching rate

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The chemical etching of boron-doped p-Si(100) and p-Si(111) substrates in Br_2+Ar mixture is considered. The experimentally measured dependences of silicon etching rate on partial pressure of Br_2 molecules are compared with those theoretically calculated. It is found that at the same temperature desorption rate constant for $SiBr_2$ molecules on p-Si(100) substrates is more than twice higher than on p-Si(111) substrates. The difference in desorption rate constants is caused by higher concentration of dangling bonds on Si(100) surface. The averaged desorption activation energy of $SiBr_2$ molecules is equal to $E_d \pm \Delta E_d = (2.02 \pm 0.11)\,eV$. The influence of crystallographic orientation on the rate constant for $Si + Br_2 \rightarrow SiBr_2$ reaction is negligible.

Keywords: Silicon; Crystallographic orientation; Chemical etching

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