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The reaction of hydrogen on ion-roughened Ge(100)

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The absorption and adsorption of atomic hydrogen on Ar^+ ion roughened Ge(100) have been studied by temperature programmed desorption (TPD). In addition to adsorption on the Ge(100) surface, hydrogen can readily diffuse into the bulk and occupy defect sites created by ion bombardment. Compared with thermal desorption from clean Ge(100)- 2×1 , hydrogen TPD from ion-roughened Ge(100) shows a new feature, as well as dihydride at 520 K and monohydride at 570 K. We observed a sharp H_2 peak with desorption temperature about 60 K higher than that of monohydride desorption. The new peak is attributed to the hydrogen in the bulk that binds to Ge defects. The desorption temperature of surface hydrogens is nearly equivalent for all ion energies while that of bulk hydrogens increases with increasing ion energies. In addition, the desorption yield of bulk peak increases with increasing ion exposures.