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Micro-Raman spectroscopy of disordered and ordered sulfur phases on a passivated GaAs surface

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Abstract

The depletion layer width and band bending of passivated n-type Sn doped GaAs(1 0 0) between subsequent steps of chemical treatment as well as after a single run treatment were investigated by micro-Raman light scattering by longitudinal optical phonons and coupled phonon–plasmon modes. Experiments were carried out ex situ at room temperature. We conclude that all observed lineshape changes are due to band bending and to an amorphous surface phase represented by a broad spectral component. We applied two passivation methods. One was based on $(NH_4)_2S_x$ solution and lasted 30 min. The second was based on the S_2Cl_2 solution and lasted 10 s. These enabled identification of surface regions of different amorphousness and for faster passivation places of enlarged and completely reduced band bending.

Keywords: Gallium arsenide; Sulfur passivation; Raman spectroscopy; Surface morphology; $(NH_4)_2S_x$; S_2Cl_2

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