

## Schottky contacts on passivated GaAs(1 0 0) surfaces: barrier height and reactivity

T. Kampen   <sup>a</sup>, A. Schüller<sup>a</sup>, D. R. T. Zahn<sup>a</sup>, Blanca Biel<sup>b</sup>, José Ortega<sup>b</sup>, Rubén Pérez<sup>b</sup> and Fernando Flores<sup>b</sup>

<sup>a</sup> Lehrstuhl für Halbleiterphysik, Institut für Physik, Technische Universität Chemnitz, D-09107, Chemnitz, Germany

<sup>b</sup> Departamento de Física Teórica de la Materia Condensada, Universidad Autónoma de Madrid, E-28049, Madrid, Spain


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### Abstract

We present results on the experimental and theoretical investigations of metal contacts on chalcogen passivated GaAs(1 0 0) surfaces. Photoemission spectroscopy investigations show that depending on the metal used for the contact formation the chalcogen passivation reduces the interaction between metals and GaAs(1 0 0). For Sb no chemical reaction at all with the substrate surface is found, while In and Ag react with the topmost chalcogen layer. For Na and Mg, on the other hand, a strong interaction is found. The chalcogenide like layer on top of the GaAs is disrupted and the metals react with the GaAs bulk, resulting in the formation of Na–As and Mg–As compounds. Concerning the barrier heights a general trend is observed, in that the barrier heights are smaller and larger for chalcogen passivated n- and p-type doped substrates, respectively, compared to the barrier heights on non-passivated surfaces. This change in barrier height can qualitatively be explained by an interface dipole, induced by the chalcogen passivation.

**Author Keywords:** Schottky contacts; GaAs; Metal–semiconductor contacts

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 Corresponding author. Present address: Abteilung Molekülphysik, Fritz-Haber-Institute der Max-Planck-Gesellschaft, Faradayweg 4-6, 14195 Berlin, Germany. Tel.: +49-30-8413 5654; fax: +49-30-8413 5603.