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Evidence for high negative charge densities in AlF_3 coatings on oxidized silicon: a promising source for large drift fields

Dirk König[a], **G. Ebest**[a], **R. Scholz**[b], **S. Gemming**[b], **I. Thurzo**[b], **T. U. Kampen**[b] and **D. R. T. Zahn**[b]

[a] Professur Elektronische Bauelemente, Fakultät Elektrotechnik & Informationstechnik, Technische Universität Chemnitz, Reichenhainer Str. 70, D-09107 Chemnitz, Germany
[b] Institut für Physik, Technische Universität Chemnitz, D-09107 Chemnitz, Germany

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Abstract

Fixed negative charges in coatings of silicon solar cells can serve as an efficient source for large drift fields, thereby passivating the silicon surface and improving charge separation of the electron–hole pairs. In the present work, we report on the evidence for a high negative charge density in AlF_3 coatings on oxidized silicon. The existence of these charges is related to sub-stoichiometric Fluorine content close to the AlF_3/SiO_2 interface, as evidenced both in measurements and density functional calculations of an electron trapped in a fluorine vacancy.

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Corresponding author. Tel.: +49-371-531-3089; fax: +49-371-531-3004; email: dirk.koenig@e-technik.tu-chemnitz.de