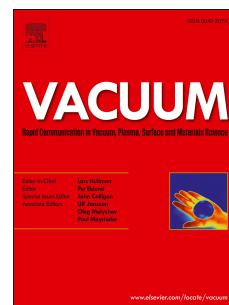


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Influence of hydrogen on the properties of titanium doped hydrogenated amorphous silicon prepared by sputtering

Tianwei Zhou, YuhuaZuo^{}, Kai Qiu, Jun Zheng, Qiming Wang*

*State Key Laboratory on Integrated Optoelectronics, Institute of Semiconductors,
Chinese Academy of Sciences, Beijing 100083, China*

E-Mail: yhzuo@semi.ac.cn

Abstract

Titanium doped hydrogenated amorphous silicon (a-Si:Ti(H)) with different gas ratio ($r_H = H_2/Ar$) were prepared by rf co-sputtering in mixture of hydrogen and argon, with fixed Ti content. The optical, structural and optoelectronic properties of the prepared a-Si:Ti(H) were investigated systematically by Spectroscopic Ellipsometry (SE), photo/dark conductivity and Fourier Transform Infrared (FTIR) measurements. With hydrogen introducing into a-Si: Ti network, the optical bandgap of a-Si:Ti(H), dark current and photosensitivity (Ratio of photo conductivity to dark conductivity) improved. However, although detectable photosensitivity occurs at r_H of 0.3, it has relatively larger microstructure factor R and less compact structure compared with r_H of 0.2 and 0.4. It is found that unintended oxygen content plays an important role in improving photosensitivity, and the relationship between microstructure, optical and photosensitivity of a-Si:Ti (H) was discussed in detail.

Keywords

Titanium doped hydrogenated amorphous silicon, photosensitivity, microstructure factor, unintended oxygen

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