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Effects of electrochemical sulfide passivation on electrical properties of Au/n-Hg₃In₂Te₆ Schottky contact

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Highlights

- 1 This passivation method reduces dangling bonds on the MIT surface by forming In-S, Hg-S, Te-O bonds.
- 2 The Te-rich layer is removed by the dissolution of tellurides produced in sulfide-passivation process.
- 3 The work functions of MIT are 4.19 eV and 4.33 eV before and after passivation respectively due to the decrease of surface states.
- 4 The sulfide passivation for Au/MIT Schottky contacts can enhance the rectifying behavior and suppress the leakage current.

Abstract

The influence of electrochemical sulfide passivation on the electronic properties of Au/n-Hg₃In₂Te₆ Schottky contact was analyzed by photoelectron spectroscopy and *I-V* measurement. Through photoelectron spectroscopy, it was obtained that the element concentration of Te decreased and In-S and Hg-S bonds appeared in surface after passivation. Meanwhile, Fermi level was depinned due to the sulfide passivation, which is proved by the rise of work function. In addition, the leakage current of Au/n-Hg₃In₂Te₆ Schottky contact reduced, owing to the decrease in the density of surface states. Thus this method is of effective capability to suppress leakage current and modify rectifying behavior.

Key words: electrochemical sulfide passivation, work function, Fermi-level pinning, surface states

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