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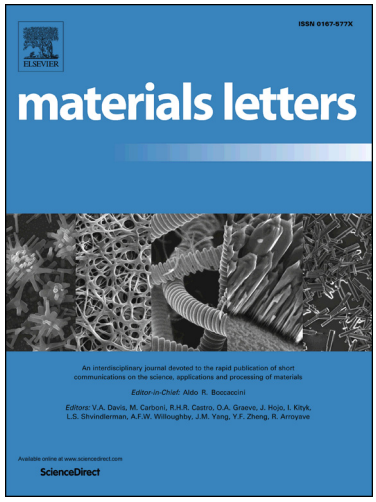

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Enhanced capacitive property of HfN film electrode by plasma etching for supercapacitors

Zecui Gao[1], Zhengtao Wu[1], Shengsheng Zhao[2], Tengfei Zhang[1,*], Qimin Wang[1,*]

[1]*School of Electromechanical Engineering, Guangdong University of Technology, Guangzhou 510006, China*
[2]*Shenzhen Polytechnic, Shenzhen518055, China*

Abstract: Transition metal nitrides (TMN) films, fabricated by physical vapor deposition (PVD), have attracted much attention in supercapacitor electrode applications due to their high conductivity, easily-controlled composition, high structural and chemical stability, and good cycling life, which are promising candidates for flexible thin-film supercapacitors and on-chip micro-supercapacitors. The main drawback of the PVD-TMN film electrodes is that they have relatively dense structure and smooth surface, which limits their specific surface area and capacitive performance of the supercapacitors. In this work, a novel strategy was employed to modify the surface morphology of TMN films by plasma etching technology. HfN films with high conductivity were chosen to be deposited by reactive DC magnetron sputtering, followed by plasma etching using Ar and Kr gases. Effects of plasma etching on the microstructure, surface morphology and electrochemical properties of the HfN films were investigated. The results indicated that plasma etching significantly changed the surface morphology and enhanced specific capacitance of the HfN films.

Keywords: HfN thin films; Physical vapour deposition; Plasma etching; Supercapacitor; Electrochemical properties

*Correspondence: tfzhang@gdut.edu.cn, qmwang@gdut.edu.cn

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