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**Tuneable Electronic and Magnetic Properties of Hybrid Silicene/Silicane  
Nanoribbons Induced by Nitrogen Doping**

Q. G. Jiang,<sup>1</sup> J. F. Zhang,<sup>1\*</sup> Z. M. Ao,<sup>2\*</sup> H. J. Huang,<sup>1</sup> Y. P. Wu<sup>1</sup>

1 College of Mechanics and Materials, Hohai University, Nanjing 210098, China

2 Institute of Environmental Health and Pollution Control, School of Environmental  
Science and Engineering, Guangdong University of Technology, Guangzhou, 510006,  
China

**Abstract**

The geometric, electronic and magnetic properties of N-doped zigzag and armchair silicene/silicane nanoribbons (Z- and A-SSNRs) have been studied by using density functional theory calculations, where silicane is the fully hydrogenated silicene. It is confirmed that the substitution of N for Si atom is preferred at the silicene/silicane interface and silicane edge. The large hydrogen diffusion energy barriers indicate high interface stability of the N-doped SSNRs. When the doping concentration is larger than a critical value, the doped Z-SSNR with N at silicene/silicane interface shows ferromagnetic semiconducting character with a magnetic moment of about 1  $\mu\text{B}$ , while the doped Z-SSNR with N at silicane edge shows metallic character and tuneable magnetic moments dependent on the silicane width. For armchair SSNR, the A-SSNR with doping N at silicene/silicane interface is a semiconductor with a local magnetic moment of about 1  $\mu\text{B}$ . However, the A-SSNR with doping N at silicane edge shows nonmagnetic metallic state. In addition, the Z- and A-SSNRs with doping N at silicene/silicane interface exhibit decreased band gaps and oscillatory band gaps, respectively, with increasing silicene width. This work provides fundamental insights for the applications of SSNRs in nanoelectronics

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\* Corresponding authors: jfzhang\_sic@163.com; zhimin.ao@gdut.edu.cn

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