Characteristics of LaSrMnO tunneling magnetorsistance devices fabricated by using scanning probe microscope

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ABSTRACT

Superconducting quantum interference devices (SQUIDs) were fabricated by inducing a selective surface modification with an atomic force microscope lithography (AFML) attached in a scanning probe microscopy (SPM) system. The surface modification was probated in the electric field of conductive AFM tip and created oxide protrusions across the entire strips as the tunneling barriers High-Tc superconducting LaSrMnO3 (LSMO) thin films were grown on SrTiO3 (STO) substrates by using rf magnetron sputtering. The photolithography and ion etching techniques were used to fabricate the thin film for SQUID pattern with mircobridges. The crystalline orientation and the surface morphology were characterized by the AFM, respectively. Experimental results show that when we applied the bias is 8V, scan speed 0.05 μm / scn, 0.8nN under pressure when the needle, the observed temperature on resistance, temperature and power of the magnetic rate of change, will be close to tunneling devices characteristics when the magnetic changes in the 10K rate of more than 0.47%. To tunneling effect is not significant for the school fruit. The temperature dependent of resistance for the fabricated SQUID reveals a resistive broadening as temperatures near Tc, showing a superconducting-tunneling-like behavior.

Keywords : Photolithography、Scanning probe microscopy (SPM)、LSMO

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