Resistive switching studies of a single silver nanowire junction by multiple-probe AFM

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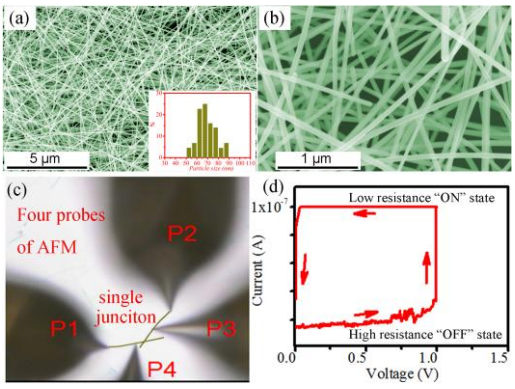
Resistive switching, which exhibits two stable resistance state by applied electrical voltage or current, have been extensively studied for use in memory devices. Recently, memristive-like electrical behaviors in Ag nanowires network have been reported.[1-2] However, the resistive switching in a single Ag nanowire junction, which is the basic unit of networks, has not been well studied.

The widely used polyol method for Ag nanowire synthesis always results in a coating of surfactant on the surface of Ag nanowire, which leads to a metal-insulator-metal sandwich structure of a single junction. Just the dielectric breakdown of the passivating organic layer make the resistive switching possible in the single junction and network of Ag nanowires.

Herein, the electrical conductivity of a single Ag nanowire junction was measured by multiple-probe atomic force microscope (MP-AFM). We found the resistance switching phenomenon in a single Ag nanowire junctions. This nonlinear conductivity is related to the conductive filament path formed beween two Ag nanowires. Now, we are trying to make this resistance switching more stable and reliable, and then we will study its potential application in nueromorphic field.



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