Short Communication

Study of the Electrochemical Preparation of Atom-Scale Iron Quantum Wire Controlled by an External Resistor

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In the present work, the stable atom-scale iron quantum wire was electrochemically prepared and characterized successfully by a homemade electrochemically controlled system. By adjusting the resistance of the external resistor, the atom-scale iron wire with preset conductance would be obtained. When scanned with low bias, the iron quantum wires showed the linear ohmic relationship for the current-voltage curve. With an external resistor control, the diameter, aspect ratio can be easily tailored, so it was a simple and controllable method. In addition, with a pure water environment of the preparation, the method had a less interference of other ions and was more suitable for sensor study of the quantum wire. The work was greatly significant for material science, molecular electronics, chemical and biological sensing.

Keywords: iron; atom-scale; magnetic materials; electrochemistry; quantum wire

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