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Crossbar structures of vanadium dioxide nanobeams[1] ZHENG YANG, KETAKI SARKAR, University of Illinois at Chicago, YANG RESEARCH GROUP TEAM — A crossbar structure composed of two individual one-dimensional nanostructure such as nanowire, nanotube, graphene nanoribbon crossed with each other has been of great interest for nanoelectronic, photonic, and memory device applications as well as novel phenomena in fundamental science. Here we report crossbar nanostructures based on crossed vanadium dioxide nanobeams. Vanadium dioxide show a metal-insulator transition at ∼340K with a sharp (3-5 orders of magnitude) resistance change accompanying with a structural change from monoclinic to tetragonal structures. Besides the thermal-triggering, other excitations in forms of electrical, photo, strain can also trigger the phase transition. In recent years lots of efforts have been focused on how to utilize the metal-insulator phase transition in vanadium dioxide for device applications (ref: Zheng Yang et al, Oxide electronics utilizing ultrafast metal-insulator transitions, Annual Review of Materials Research, 2011, 41, 337). In this presentation, the growth, fabrication, structural and electrical properties of the vanadium dioxide nanobeam crossbars will be reported. The potential device applications of vanadium dioxide nanobeam crossbars will be discussed.

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