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Metal-insulator transition and domains in suspended VO2 nanobeams[1] JIANG WEI, WEI CHEN, ZENGHUI WANG, DAVID COBDEN, University of Washington — VO_2 undergoes a metal-insulator transition (MIT) around 67°C. We investigate the transition in suspended crystalline nanobeams of VO_2. The nanobeams are grown by vapor phase deposition on SiO_2 substrates and contacted by electron beam lithography with chromium-gold metallisation. After suspending them by selectively etching away the substrate, the resulting nanobeams are firmly clamped at the contacts. Under some conditions the MIT occurs suddenly throughout the entire beam, associated with a single hysteretic conductance jump. This is in contrast with the behavior of nanobeams attached to the substrate in which alternating metallic and insulating domains form during the transition. Under other conditions, a single metallic domain forms and grows gradually as temperature is increased. At room temperature the longer beams are buckled, and on warming they unbuckle when the MIT occurs. When a force is applied to bend a suspended nanobeam, alternating domain patterns form in the bent region reflecting the strain field.

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