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Investigation of the Effect of Crystal Thickness on Free-Standing Vanadium Dioxide Nanocrystals[1] SERKAN KASIRGA, MUSTAFA FADLELMULA, Bilkent University- UNAM — The first-order metal-insulator transition (MIT) that vanadium dioxide exhibits at 65 ^{o}C has been extensively studied in the last decade thanks to the growth of single crystal nanobeams/plates smaller than characteristic domain size as well as the advances in epitaxial film growth techniques. The effect of crystal thickness has been studied extensively in epitaxially grown VO_2 films yet not in free-standing nanocrystals[1]. This is mainly due to lack of control over the crystal thickness in physical vapor transport growth of the nanocrystals. Here, we report first observations on the MIT of VO_2 nanocrystals grown on oxidized silicon substrate thinned using argon-ions. Among these observations AFM measurements reveal an etch rate of 4 nm/min for 1keV Ar-ion energy. Two terminal suspended nanobeam measurements reveal an intriguing phase transition properties below a threshold thickness. [1]Aetukuri, N.B. et al. Nature Phys. 9, 661-666 (2013).

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