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Title:Synthesis and terahertz transmission properties of nano-porous vanadium dioxide films
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Abstract:Vanadium dioxide (VOinf2/inf) films were prepared by the solgel method on high-purity silicon substrates, in which cetyltrimethyl ammonium bromide (CTAB) was used as a functional additive to form nano-porous structure in the VOinf2/inf films. The morphology, crystalline structure and stoichiometry of the films were investigated by field emission scanning electron microscopy, x-ray diffraction and x-ray photoelectron spectroscopy. Furthermore, the effects of nano-scaled grain size and pores on the THz transmission properties across the phase transition in the VOinf2/inf films were studied. The results indicated that the film modified with CTAB can form a nano-porous VOinf2/inf structure with a uniform grain size of about 30nm. The nano-porous VO inf2/inf film exhibited significantly broader hysteresis loops and a slight decrease in THz transmission reduction across the phase transition, compared with the common film without a nano-porous structure. A tentative interpretation is given for these phenomena. © 2012 IOP Publishing Ltd.
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