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Abstract:We report studies of the terahertz (THz) transmission through vanadium dioxide (VOinf2/inf) thin films grown on c-, m-, and r-plane sapphire substrates. Our results revealed THz amplitude modulation as large as 84% for VOinf2/inf films grown on r-plane sapphire substrates upon crossing the metal-insulator phase transition temperature. Complex optical conductivity and refractive indices were determined for all investigated samples in the metallic state. Results are consistent with electrical resistivity measurements and described based on the Drude model. The real and imaginary parts of the optical conductivity and refractive index are obtained, and associations with variations in the grain morphology and crystal quality are described. We show that VO inf2/inf thin films can be used as tunable broadband THz frequency antireflecting coatings. © 2012 Optical Society of America.
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