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Voltage switching of a VO_2 memory metasurface using ionic gel M.D. GOLDFLAM, M.K. LIU, B.C. CHAPLER, H.T. STINSON, A.J. STERNBACH, A.S. MCLEOD, Univ of California - San Diego, J.D. ZHANG, K. GENG, Boston University, M. ROYAL, Duke University, BONG-JUN KIM, ETRI, R.D. AVERITT, Univ of California - San Diego, N.M. JOKERST, D.R. SMITH, Duke University, HYUN-TAK KIM, ETRI, D.N. BASOV, Univ of California - San Diego — We have demonstrated large area, low voltage, non-volatile tuning of an electrolyte-based vanadium dioxide (VO_2) THz memory metasurface. Using ionic gel gating, voltage is applied to drive the insulator-to-metal transition in an underlying VO_2 layer. Through application of positive and negative voltages, the metasurface resonance can be switched into the "off" or "on" state by driving VO_2 into a more conductive or insulating regime, respectively. As compared to our graphene-based control devices, the longer saturation time of resonance modification in VO_2-based devices suggests that this voltage-induced switching originates primarily from electrochemical effects resulting from oxygen migration across the electrolyte-VO_2 interface.

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