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Protonic motion in $Pr_{0.7}Ca_{0.3}MnO_3$ thin films and its implications on resistance change properties[1] MIHIR TENDULKAR, NICHOLAS BREZNAY, YOSHIO NISHI, Stanford University — Thin films of $Pr_{0.7}Ca_{0.3}MnO_3$ (PCMO) exhibit resistance-change properties that are of acute interest for next-generation memory solutions. Recent work has demonstrated that oxidation / reduction of a reactive electrode is critical to the switching process, suggesting that interface engineering will solve the reliability issue. We show that an overlooked contributor to the process is hydrogen, which dopes the bulk film. Activated conduction and loss tangent measurements are correlated with FTIR spectra to demonstrate protonic motion through the repeated breaking and reforming of –OH bonds. SIMS and Hall measurements are presented in conjunction with UV-Vis spectroscopy to show that hydrogen also alters the electronic structure of the PCMO film. The implications of these effects on forming and switching are discussed.

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Mihir Tendulkar
Stanford University

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