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Anisotropic Etching of $SrTiO_3$

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ANISOTROPIC ETCHING OF $SrTiO_3$

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The anisotropic etching properties of silicon seem to gain ever more technological importance as we enter the age of microelectromechanical devices, but the anisotropic etching of more highly polarizable materials such as $SrTiO_3$ has been relatively unstudied. We have reproducibly observed pyramidal pitting of single crystal $SrTiO_3$ surfaces, which is indicative of anisotropy in the etch rates. For a variety of etch conditions (concentration, time of etch, initial crystallographic orientation of the sample surface), we measure the depth from unetched areas down to the bottoms of etch pits on $SrTiO_3$ single crystals. By comparing these etch rates, along with the temporal evolution of the angles of the etch pit walls, we extract a measure of the anisotropy of etching. We present what we have learned of the kinetic bottlenecks in the etch process within a context supplied by our own theoretical calculations of lattice potentials for a variety of possible surface angles and surface terminations.