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Bulk Etch Rate and Swell Rate of CR-39 DAVID CLARKSON , RUBAB UME , REBECCA SHEETS , Dept of Physics & Astronomy, State Univ of NY at Geneseo, SEAN REGAN, CRAIG SANGSTER, Laboratory for Laser Energetics, STEPHEN PADALINO, JAMES MCLEAN, Dept of Physics & Astronomy, State Univ of NY at Geneseo — The use of CR-39 plastic as a Solid State Nuclear Track Detector is an effective technique for obtaining data in high-energy particle experiments including inertial confinement fusion. To reveal particle tracks after irradiation, CR-39 is chemically etched in NaOH at 80°C, producing micron-scale signal pits at the nuclear track sites. The development of these pits depends on both the bulk etch rate and the faster etch rate along the track, and is complicated by swelling as water is absorbed. Contrary to common etching models, we find the bulk etch rate to be depth dependent within 15 μm of the surface, as revealed by swelling TASTRACK CR-39 pieces to their maximum capacity prior to etching. The bulk etch rate was measured using the standard mass method as well as the fission fragment track diameter method. Combining models of swelling and etching rates predicts the progress of bulk etching during a standard etch, without pre-swelling. This result has implications for the understanding the chemistry of the etch process, as well as the outcome of CR-39 surface preparation methods. Funded in part by a LLE contract through the DOE.

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