

## **Swelling of SiO<sup>2</sup> quartz induced by energetic heavy ions**

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A pronounced swelling effect occurs when irradiating SiO<sup>2</sup> quartz with heavy ions (F, S, Cu, Kr, Xe, Ta, and Pb) in the electronic energy loss regime. Using a profilometer, the out-of-plane swelling was measured by scanning over the border line between an irradiated and a virgin area of the sample surface. The step height varied between 20 and 300 nm depending on the fluence, the electronic energy loss and the total range of the ions. From complementary Rutherford backscattering experiments under channelling condition (RBS-C), the damage fraction and corresponding track radii were extracted. Normalising the step height per incoming ion and by the projected range, a critical energy loss of  $1.8 \pm 0.5$  keV/nm was found which is in good agreement with the threshold observed by RBS-C. Swelling can be explained by the amorphisation induced along the ion trajectories. The experimental results in quartz are compared to swelling data obtained under similar irradiation conditions in LiNbO<sub>3</sub>.