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Facets and Fissures of a Fractured SOI Wafer

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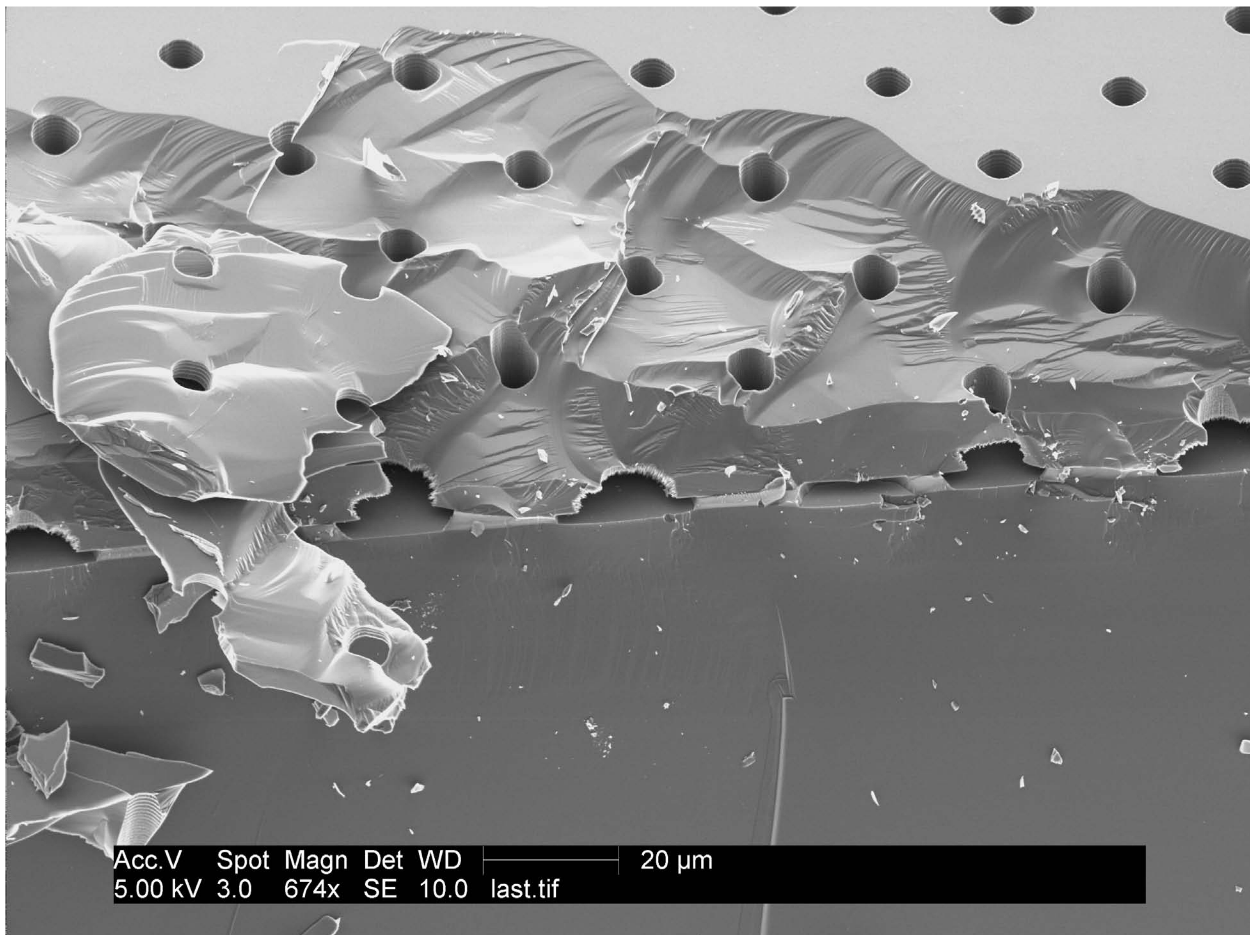

This scanning electron micrograph shows a cross section of a cleaved silicon-on-insulator (SOI) wafter. The wafer cleave passed through a partially released device that included the array of etch release holes visible in this image. The patterned monocrystalline silicon layer had a different crystalline orientation than the much thicker monocrystalline silicon substrate. When the wafer was cleaved, substrate silicon fractured along a single crystalline plane, leaving a flat, smooth surface. The patterned layer did not share this crystalline plane, and fractured in many directions resulting in an irregular, multi-faceted surface.

Fragments of the patterned silicon layer at the left of the image have remained at the fracture. Though immobilized by electrostatic forces, these fragments appear to be falling from the wafer as if it had been cleaved the instant this image was taken.

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