In Situ Deformation of Ceramic Bi-Crystals

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There are many interesting mechanical properties that can be achieved with metal/ceramic multilayers especially if they are defined more broadly to include structures such as MAX phases. However, the deformation mechanisms, such as hysteresis, can be complex. To simplify the problem, in this work we have concentrated on the effect of a single metal interlayer within a ceramic bi-crystal. The samples were produced by sputtering Niobium on to sapphire substrates and then diffusion bonding the two coated crystals together. This allowed the production of sapphire micropillars with containing a ~50-200 nm niobium layer. These were then loaded *in situ* within a microbeam laue set up. By varying the layer thickness the measured strength of the pillar could be varied along with the magnitude of the hysteresis. This hysteresis was tracked by the load-displacement trace along with the movement and elongation of diffraction spots associated with the interlayer.