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Statistics and activation parameters of the elastic-plastic transition in crystals

The load at which a discrete displacement burst or pop-in occurs, when nanoindentation is performed with a spherical indenter tip, is a measure of the transition from elastic to elasto-plastic deformation. By experimentally measuring the first pop-in loads, P_1 , and assuming that their statistical distribution is caused by the thermal fluctuations affecting the nucleation rate of the incipient plastic events, the activation volumes and energies for the elastic-plastic transition in crystals can be determined. In this presentation, I will summarize our efforts in this direction with the results on amorphous alloys, high entropy alloy, molecular crystals, and ceramics. New insights we gained through these experiments and analyses will be discussed.

After obtaining a PhD degree from Brown University and post-doctoral stints at UCSB and MIT, **Ramamurty** held faculty positions at NTU and IISc, before returning to NTU in 2018 where he currently holds a President's Chair Professor position. His current research interests include deformation and fracture behavior of amorphous as well as crystalline alloys, additive manufacturing, and the development and application of the nanoindentation technique. He published 308 papers in peer reviewed international journals and is an editor of *Acta Materialia* and *Scripta Materialia*. He is an elected Fellow of both the National Academies of Engineering and Sciences of India, and TWAS-The World Academy of Sciences, and is a recipient of the Scopus Young Scientist and National Metallurgist Day awards, Shanti Swarup Bhatnagar and TWAS prizes (both in Engineering Sciences category), and Swarnajayanthi and JC Bose National Fellowships. He delivered the CNR Rao Prize Lecture in Advanced Materials of the Materials Research Society of India and the Lee Hsun Award Lecture of IMR, Chinese Academy of Sciences. He is an Honorary Professor at the International Centre for Materials Science, JNCASR and Qiushi Distinguished Visiting Professor of Zhejiang University, China.