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**Fracture and Failure of Nanoparticle Monolayers and Multilayers** YIFAN WANG, PONGSAKORN KANJANABOOS, University of Chicago, ED-WARD BARRY, Argonne National Laboratory, SEAN MCBRIDE, University of Chicago, XIAO-MIN LIN, Argonne National Laboratory, HEINRICH JAEGER, University of Chicago — We present the first systematic investigation of fracture in self-assembled gold nanoparticle mono- and multilayers, attached to elastomer substrates and subjected to tensile stress. Imaging the fracture patterns down to the scale of single particles provides detailed information about the crack width distribution and allows us to compare the scaling of the average crack spacing as a function of strain with predictions by shear-lag models. With increasing particle size, the fracture strength is found to increase while it decreases as the film thickness is built up layer by layer, indicating stress inhomogeneity and crack propagation in the thickness dimension.

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