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Folding and bending of self-assembled nanoparticle membranes YIFAN WANG, The University of Chicago, JIANHUI LIAO, Peking University, SEAN MCBRIDE, EFI EFRATI, The University of Chicago, XIAO-MIN LIN, Argonne National Laboratory, HEINRICH JAEGER, The University of Chicago — We demonstrate that self-assembled nanoparticle monolayers can be folded into 3 dimensional hollow structures – nanoparticle scrolls, by utilizing their internal strain gradient. Using an Atomic Force Microscope (AFM), indentation measurements were made on these nanoparticle scrolls, and the bending modulus of the nanoparticle membrane is obtained for the first time. The resulting bending modulus is two orders of magnitude larger than that predicted by classical continuum elastic theory, we show this can be explained by a micropolar theory as the material thickness approaches single nanoparticle size.

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