

Abstract Submitted
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Tens of micro-scale wavy crack propagation in silicon nitride films¹ DONGHYUN KIM, PRASHANTH MAKARAM, CARL THOMPSON, Department of Materials Science and Engineering, Massachusetts Institute of Technology — Microscale wavy crack propagation of silicon nitride thin film was found during heating process, which is the first discovery for a silicon nitride film, since Yuse and Sano found the oscillating crack propagation of a glass sheet. The wavy crack characteristics were investigated by changing the metal, metal line widths, metal thickness and silicon nitride thickness. The paths of this crack can be controlled by a metal pattern, which allows decohesion between silicon nitride and SiO₂ substrate so that the silicon nitride can buckle. The crack initiates at the boundary of a buckled area and then propagates towards the strained area on the low reactive metal patterning for relieving strain energy. The width of the wavy crack can be controlled down to submicron scale, hence can be directly applied for nanofabrication and microfluidic techniques. We discussed the difference between Yuse' and Sano' experiment and our findings. This study provides a bridge to broaden the discussion between the physics and mechanics community that focuses on fracture theory and other communities researching in nanofabrication.

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