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**A numerical study on the material removal and phase transformation  
in the nanometric cutting of silicon**

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**Abstract**

The mechanism of material removal process at the nanoscale lays the foundation for nanomachining technology. There are two major material removal mechanisms in cutting: extrusion and shear. Though the shear theory has been successful in describing the conventional macro cutting methods, it may not be suitable for understanding the material removal at the nanoscale. As an alternative, the extrusion model was proposed for nanometric cutting. However, the concept of extrusion remains ambiguous, and the differences between extrusion and shear have not been fully clarified. In this research, molecular dynamics is performed to study material removal under various cutting

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