**Supplementary Movie Legends**

**Supplementary Movie 1 (separate file). Dynamic simulation at zero normal load and zero temperature for system with *θ*m = 8°.**

**Supplementary Movie 2 (separate file). Quasistatic simulation at 2.9 GPa normal load for system with *θ*m = 8°.**

**Supplementary Movie 3 (separate file). Dynamic simulation at 2.9 GPa normal load and zero temperature for system with *θ*m = 8°.**

**Supplementary Movie 4 (separate file). Dynamic simulation at 2.9 GPa normal load and zero temperature for an enlarged system with *Lx* = 47.7 nm and *θ*m = 8°.**

**Supplementary Movie 5 (separate file). Dynamic simulation at 2.9 GPa normal load and zero temperature for system with *θ*m = 21.8°.**