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Efficient sticking of surface-passivated Si nanospheres via phase-transition plasticity TRAIAN DUMITRICA, MAYUR SURI, University of Minnesota — Large-scale atomistic simulations considering a 5 nm in radius H-passivated Si nanosphere that impacts with relatively low energies onto a H-passivated Si substrate reveal a transition between two fundamental collision modes. At impacting speeds of less than 1000 m/s particle-reflection dominates. At increased speeds the partial onset in the nanosphere of a beta-tin phase on the approach followed by a-Si phase on the recoil is an efficient dissipative route that promotes particle capture. In spite of significant deformation, the integrity of the deposited nanosphere is retained. Our result explains the efficient fabrication of nanoparticulate films by hypersonic impaction, where the nanoparticle impact velocities equal 1000-2000 m/s.

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