

Next generation data storage with baroplastic block copolymer by room temperature AFM lithography

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In an attempt to fabricate ultrahigh-density array using block copolymer, nanopatterns are directly generated on poly(styrene-*block*-(*n*-pentylmethacrylate))(PS-*b*-PnPMA) film using an atomic force microscope(AFM) tip at room temperature. Unlike general method of block copolymer lithography, this approach uses pressure by AFM tip without heating. PS-*b*-PnPMA film is easily patterned at room temperature because of its baroplastic property that enables processing at a relatively lower pressure and temperature by microphase transition. Cross-sectional transmission electron microscopy(TEM) image clearly showed that nanopatterns were achieved through a microphase transition. Finally, fabricated nanopatterns are transformed into electrical signals by using piezoelectric sensor and showed repeated erasing and rewriting steps. This demonstration of a pressure-based phase-change memory at room temperature shows great possibility of next-generation ultrahigh-density data storage media.

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