Electronic Supplementary Information

Template-directed self-organization of colloidal PbTe nanocrystals into pillars, conformal coatings, and self-supported membranes

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Fig. S1 Laboratory setup for PbTe NCs synthesis: three-neck round-bottom flask placed in a heating mantle and attached to a Schlenk line.

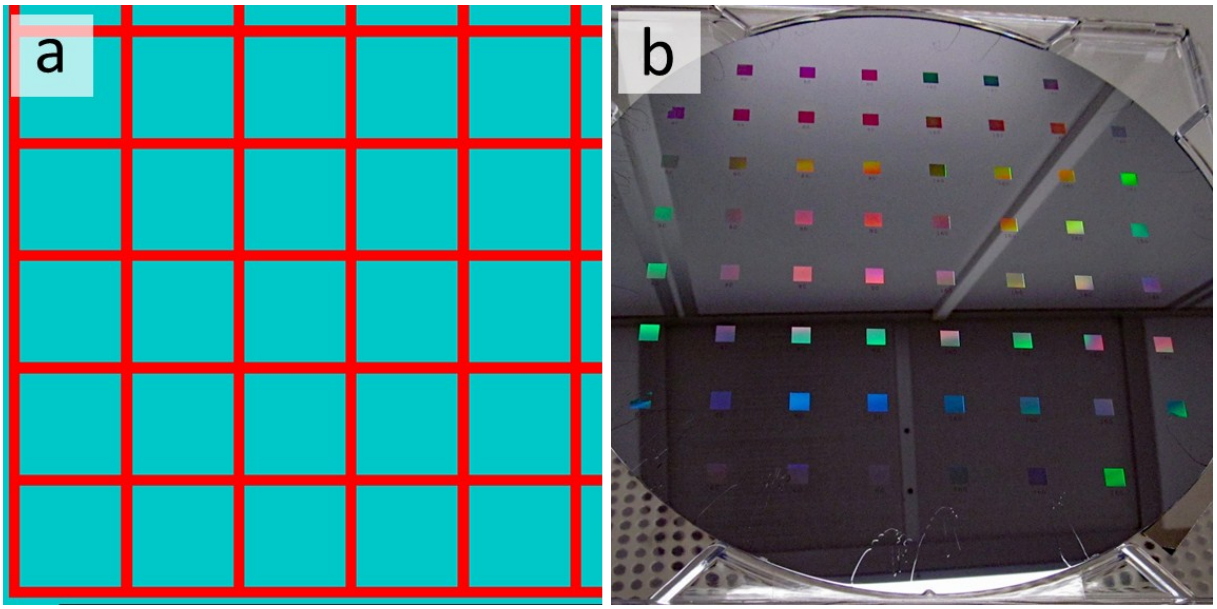

Fig. S2 Mesh pattern for e-beam lithography: crossing 160-nm-wide stripes define 1×1 μm^2 squares (a). As-fabricated pre-patterned Si wafer after e-beam lithography procedure, before dicing: 60 layouts of 5×5 mm^2 square areas filled with the mesh pattern are visible (b).

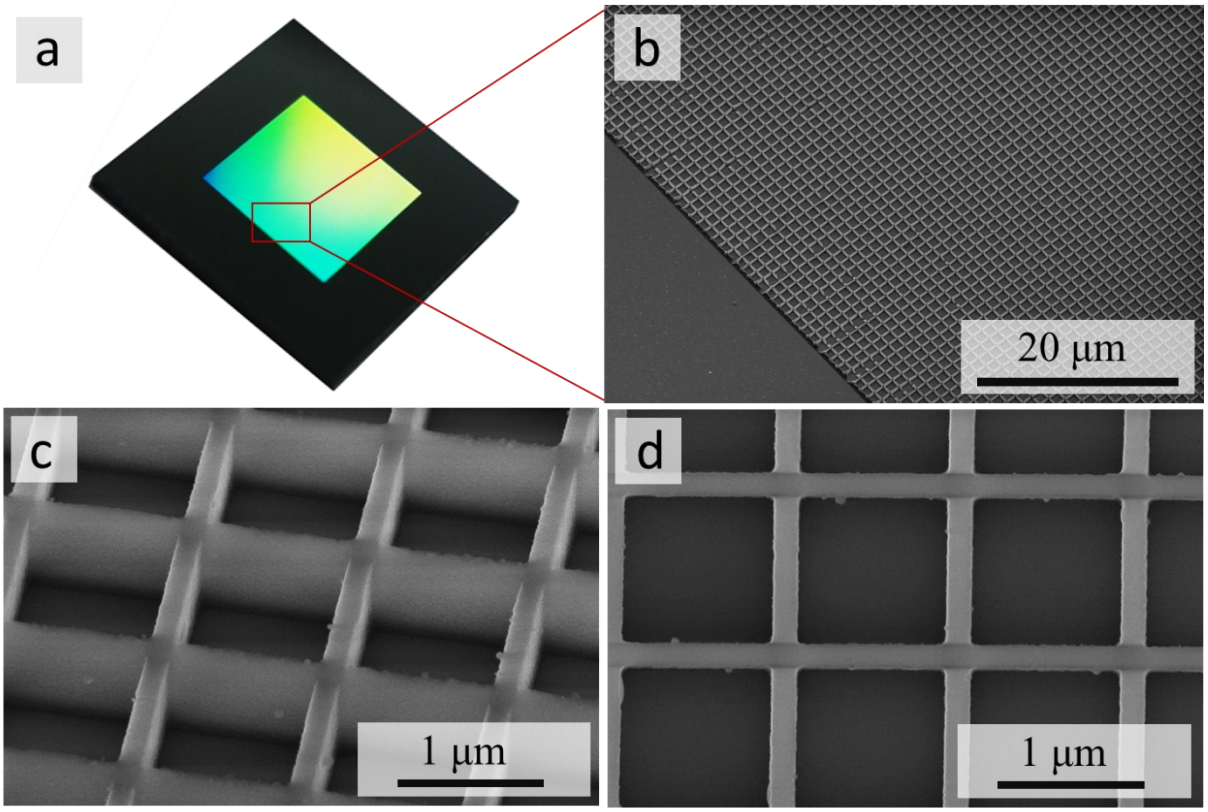

Fig. S3 Silicon substrates patterned by e-beam lithography, after dicing. Photograph of a 1×1 cm^2 square substrate with the 5×5 mm^2 patterned area in the center (a). SEM images of the resist grid on the patterned substrate: tilted-view at low (b) and high (c) magnifications, top-view at high magnification (d); the walls of the resist grid are ca. 160 nm wide and ca. 800 nm high.

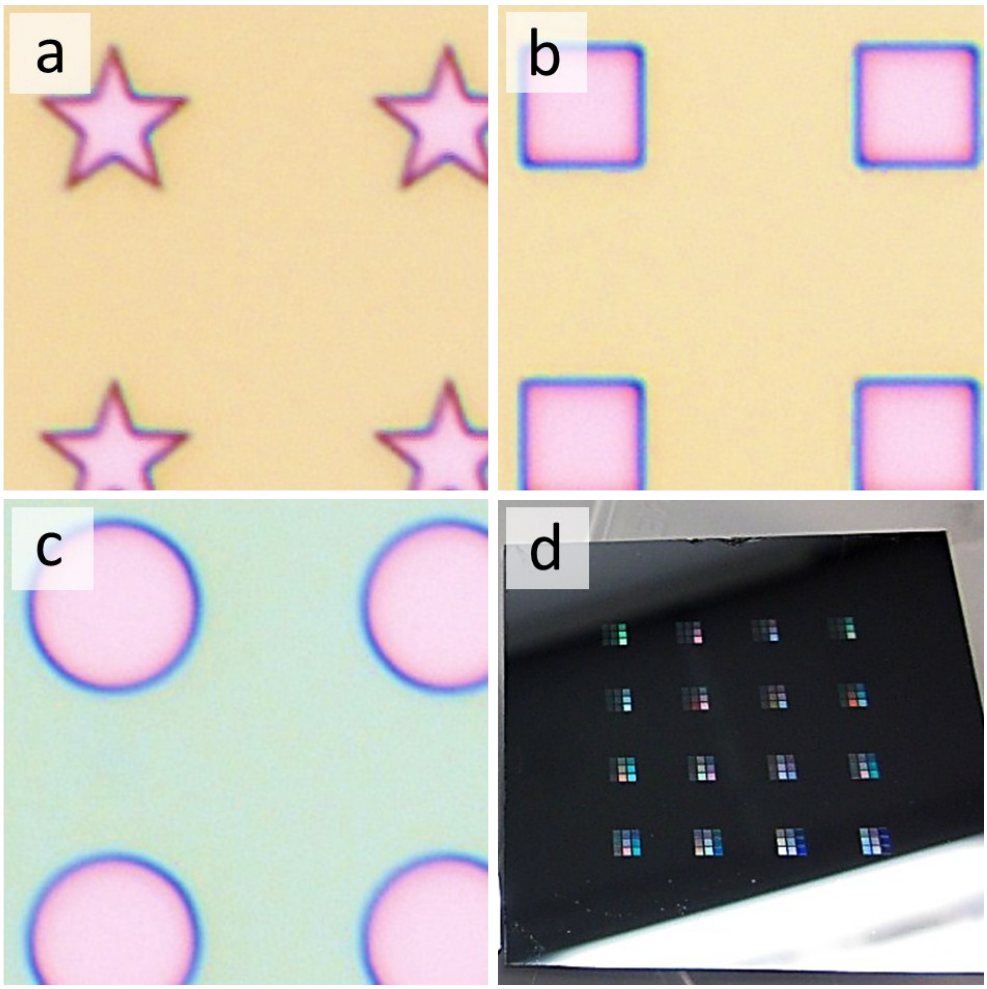

Fig. S4 Optical images of patterned substrates after e-beam lithography, before etching (a–c); 430-nm-thick PMMA AR-P 679.04 resist was patterned by e-beam operating at 100 kV, 70 nA, step size of 25 nm, and dose of 800 μC cm^{-2}. Patterned wafer after etching and ashing, before dicing (d); 16 groups, with 9 patterned squares in each one, are visible in this photograph.

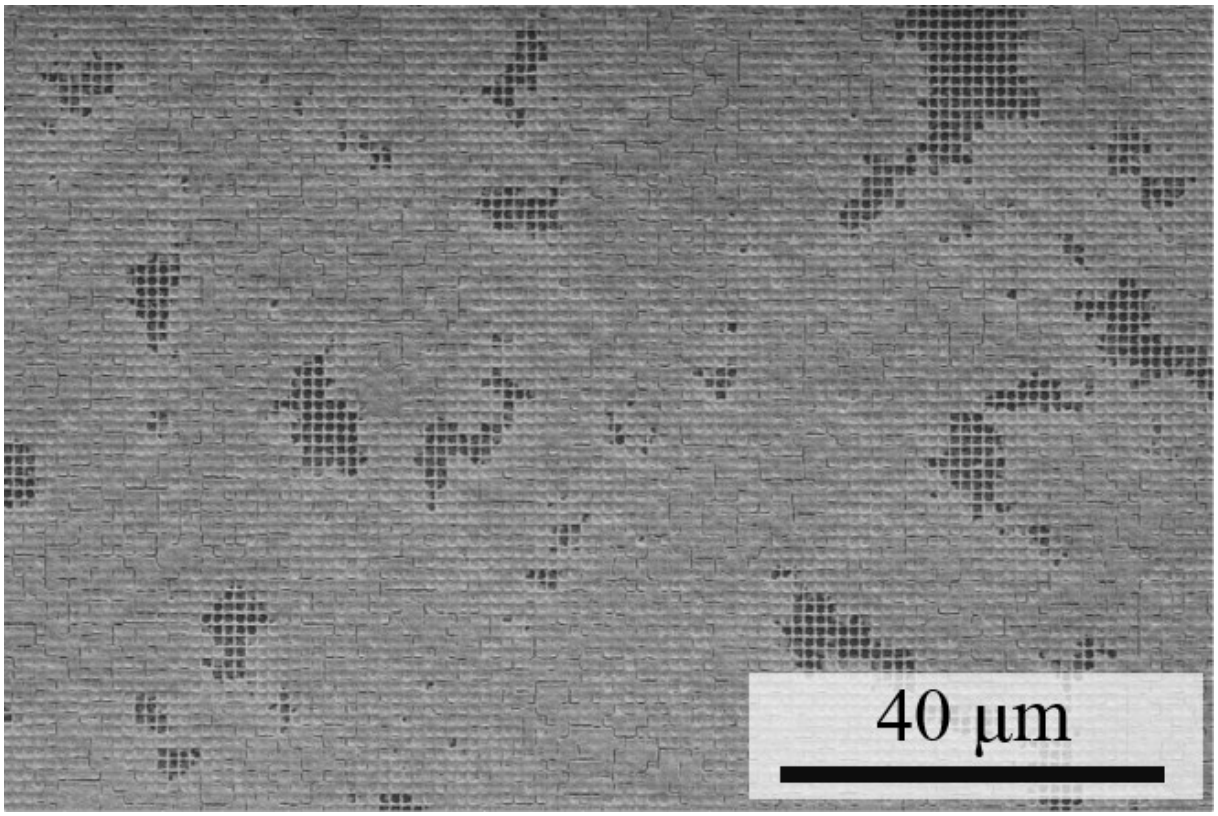

Fig. S5 SEM image of a mesh-patterned Si substrate after PbTe NCs deposition, before the resist removal. The poor distribution of the NC dispersion across this substrate illustrates how the variation in NC concentration produces defective morphologies of the 3D micropillars.

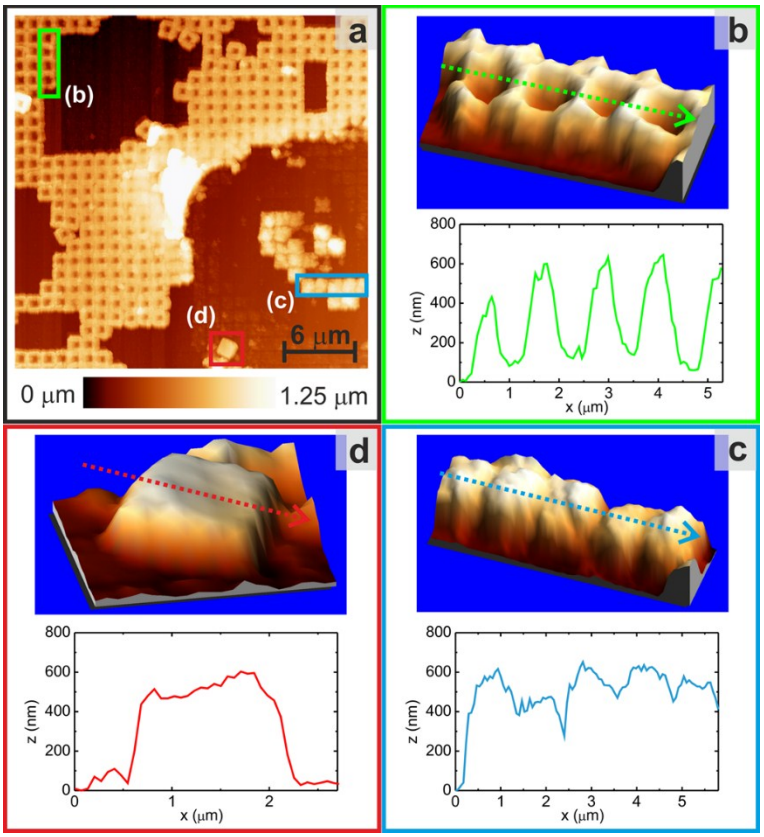

Fig. S6 Surface topography image of disrupted structure in the substrate obtained by AFM tapping mode (a); detailed images and line profiles of micropillars with concave (b), convex or "ragged edge" (c), and flat (d) morphologies.

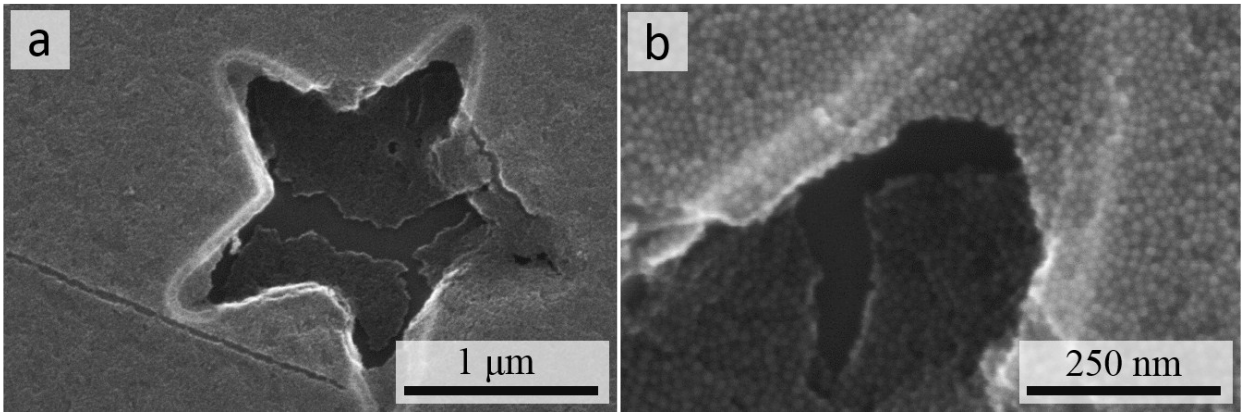

Fig. S7 SEM images of an intentionally ruptured self-supported membrane over a star-shaped microscale cavity. The overview (a) and close-up (b) images clearly indicate that the rupture follows the outline of the pattern.