Supporting Information

Repeated Shape Recovery of Clustered Nanopillars by Mechanical Pulling

Sang Moon Kim\textsuperscript{a,b,†}, Seong Min Kang\textsuperscript{b,c,†}, Chanseok Lee\textsuperscript{c}, Segeun Jang\textsuperscript{c}, Junsoo Kim\textsuperscript{d}, Hyein Seo\textsuperscript{e}, Won-Gyu Bae\textsuperscript{f}, Shu Yang\textsuperscript{g,*}, and Hyunsik Yoon\textsuperscript{e,*}

\textsuperscript{a}Department of Mechanical Engineering, Incheon National University, Incheon, 406-772, Korea
\textsuperscript{b}Global Frontier Center for Multiscale Energy System, Seoul National University, Seoul 151-744, Korea
\textsuperscript{c}Department of Mechanical and Aerospace Engineering, Seoul National University, Seoul, 151–742, Korea
\textsuperscript{d}Energy Harvesting Devices Research Section, Electronics and Telecommunications Research Institute, Daejeon 305-700, Republic of Korea
\textsuperscript{e}Department of Chemical and Biomolecular Engineering, Seoul National University of Science & Technology, Seoul, 139-743, Korea
\textsuperscript{f}Department of Electrical engineering, Soongsil University, Seoul, 156-743, Korea
\textsuperscript{g}Department of Materials Science and Engineering, University of Pennsylvania, Philadelphia, PA 19104-6272, USA

[†] S. M. Kim and S. M. Kang contributed equally to this work.
[*] E-mail: hsyoon@seoultech.ac.kr and shuyang@seas.upenn.edu
**Figure S1.** Schematic illustration of the UV curing process of PUA infiltrated between the nanopillars. During UV exposure, free radicals are generated from the photoinitiator, which react with the acrylate groups on the prepolymer, leading to a crosslinked network.
Figure S2. Optical image of (a) an as-fabricated silicon master with a nanohole array over a large area (~10 cm × 7 cm), (b) a replicated PUA 301 nanopillar array from the silicon master, (c) a clustered nanopillar array, and (d) a recovered nanopillar array.
**Figure S3.** SEM images of the fabricated HAR nanopillar arrays using soft PUA (MINS 301), PDMS, hard PUA (MINS 311), and NOA 71, respectively. PUA 301 apparently is the most suitable material for replicating the HAR structures from a silicon master compared to other polymers. The scale bar in PUA 301 image is applicable to all images.
Figure S4. Pictures of a custom-built equipment for measuring the adhesion force of samples. The measured value was ~10.8 ±1.1 N cm$^{-2}$, which is higher than the calculated separation force (~3.7 N/cm²) to overcome adhesion between clustered pillars.
Figure S5. Cross-sectional SEM images of the negative PUA patterns after demolding from (a) the originally straight and (b) the clustered HAR nanopillar arrays.