Facile Transferring of Wafer-Scale Ultrathin Alumina Membranes onto Substrates for Nanostructure Patterning

Ahmed Al-Haddad,[†,‡] *Zhibing Zhan,*[†] *Chengliang Wang,*[†] *Samar Tarish,*[†,‡] *Ranjith Vellacheria,*[†] *and Yong Lei* [*,†]

[†] Institute for Physics & IMN MacroNano (ZIK), Ilmenau University of Technology, Professor Schmidt Strasse 26, 98693 Ilmenau, Germany

[‡]Department of Physics, College of Science, University of Al-Mustansiryah, Baghdad, Iraq.

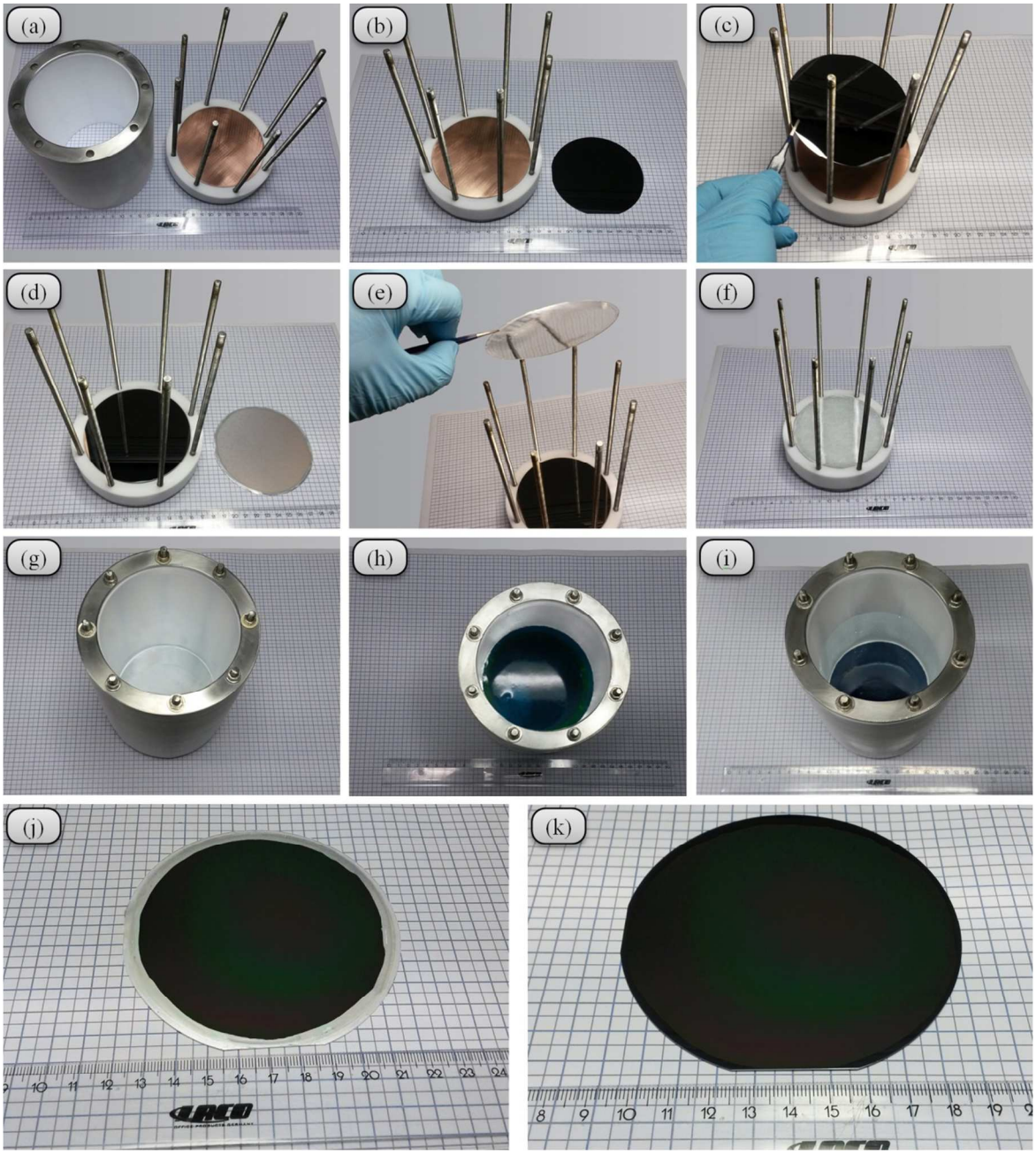

Figure S1. Photographs of transferring a 4-inch UTAM onto Si wafer by using the innovative anodization and transferring cell. (a-g) Fixing the Si wafer and the prepared UTAM (with Al backside and barrier layer) inside and assembling the cell. (h) Removing the Al backside in mixture solutions of $CuCl_2$ (85 wt %) and HCl (15 wt %) for 10 min. (i) Removing the barrier layer by using H_3PO_4 solution (5 wt %) at 30 ºC. After dissembling the cell, the attached UTAM on Si wafer is obtained (j) before and (k) after removing the residual Al frame.

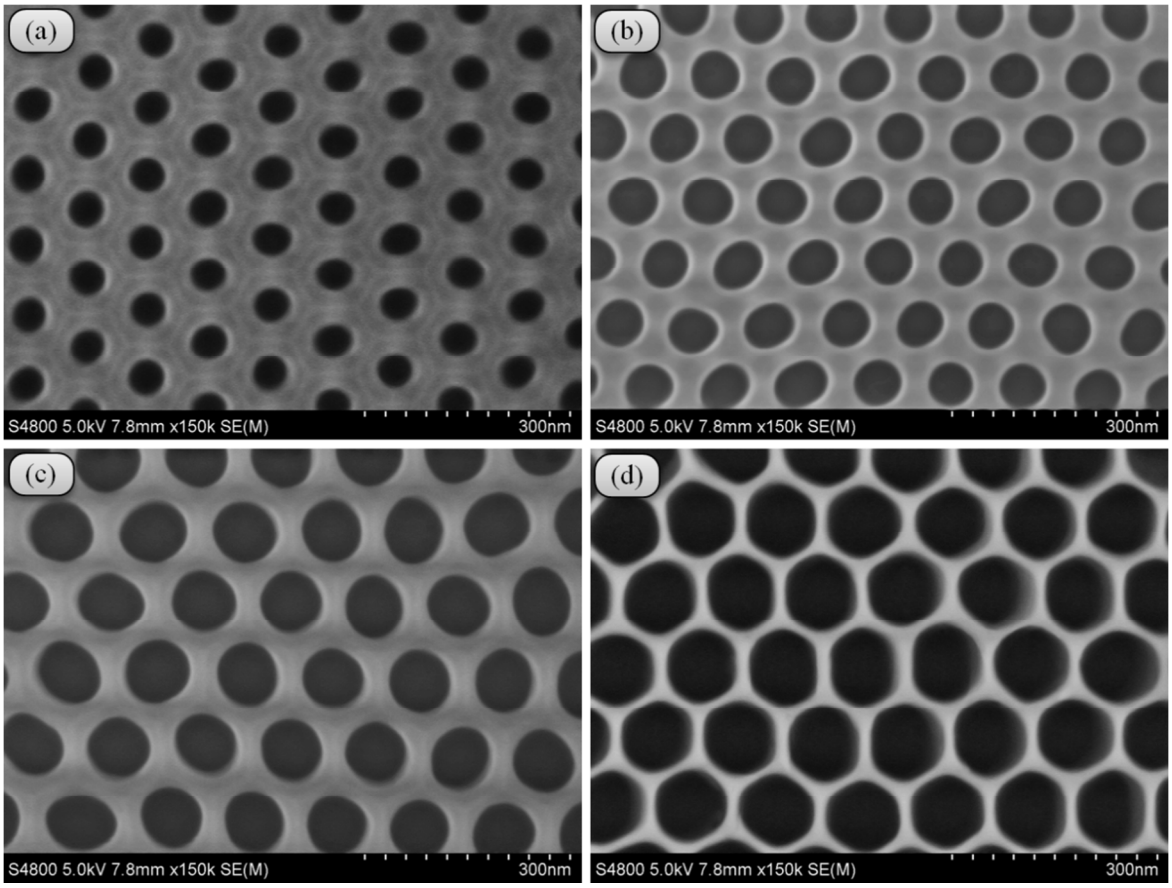

Figure S2. SEM images of prepared UTAMs with average nanopore diameters of about (a) 45, (b) 60, (c) 75 and (d) 90 nm.

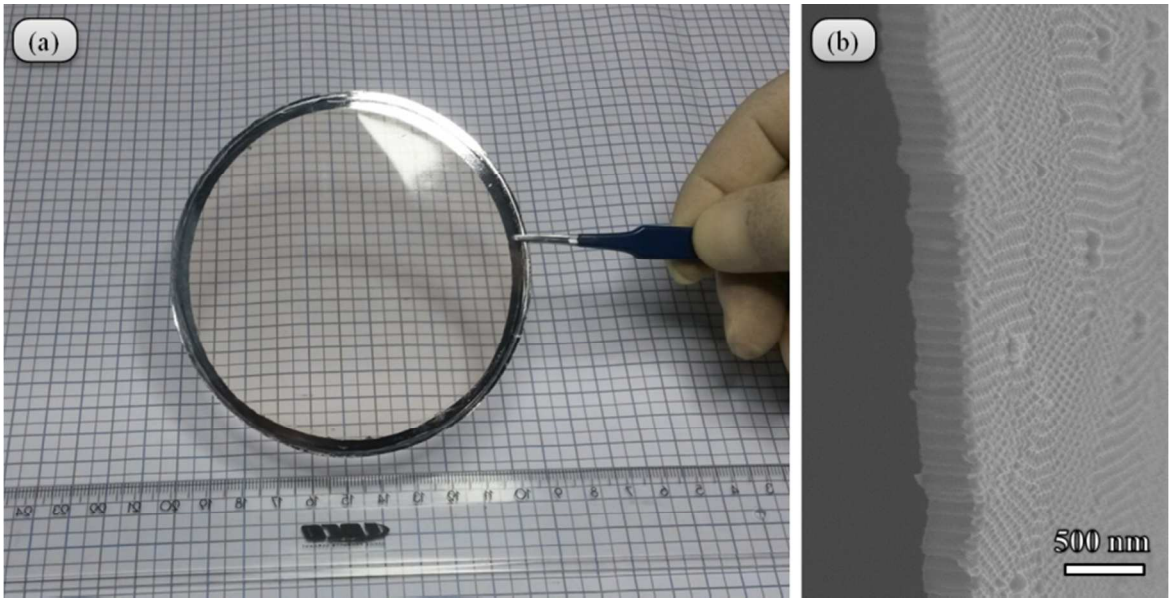

Figure S3. (a) Photograph of a free standing 4-inch wafer scale UTAM with the residual Al frame. (b) Large area SEM image of the free standing UTAM with thickness about 500 nm.

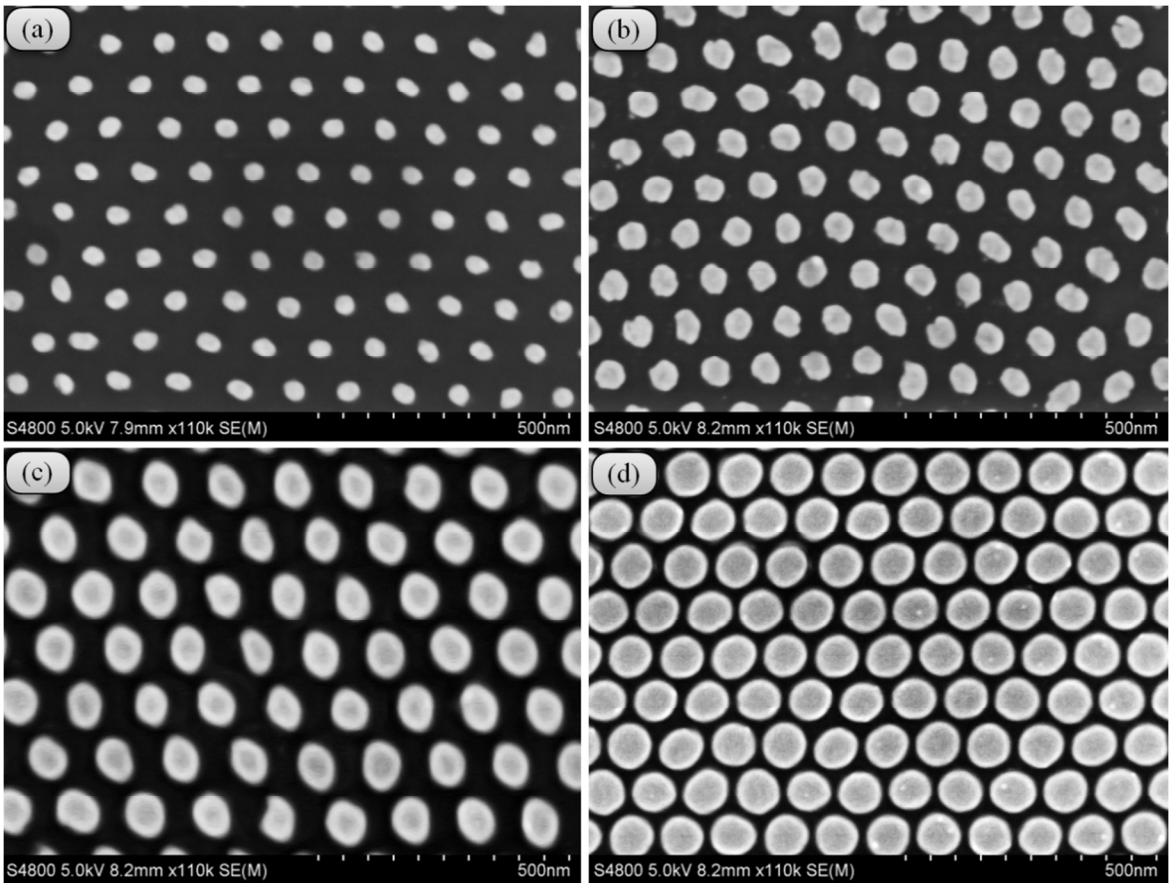

Figure S4. SEM images of Au nanoparticle arrays with average diameters of about (a) 45, (b) 60, (c) 75 and (d) 90 nm.