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Sacrificial Nanoimprint Lithography as a Scalable Approach to Porous Polymer Membranes LIN LEI, IMRHANKHAN SHAJAHAN, Rutgers Univ, DEVIN SHAFFER, EDWIN CHAN, National Institute of Standards and Technology, JONATHAN SINGER, Rutgers Univ — The use of sacrificial templates for nanoimprint greatly expands the capability of the method particularly with regards to maximum aspect ratio. Here, we demonstrate the ability for the sacrificial imprint method using ZnO nanorods to produce porous polymer membranes. It is established that such structures can be grown cheaply and quickly with tunable morphologies on a wide variety of substrates, which we exploit to generate the nanoscale imprint features through this bottom-up approach. In this technique, rods grown on one substrate are transferred to a film through a combination of nanoimprint and nanotransfer printing. Since the oxide materials are sacrificial and regrowable, issues of detachment are mitigated. Through etching the oxide, we are left with a dense array of pores in the transferred material. By using a supported polymer film thinner than the oxide rods, these films become perforated membranes. In this study, we employ the technique to produce films with sub-100 nm pores and pore aspect ratios exceeding 5 for the application of support layers for osmosis membranes. Due to the flexibility of the sacrificial imprint paradigm, films produced in this way are highly scalable to large areas or even roll-to-roll processing.

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