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Microchannel molding: A soft lithography-inspired approach to micrometer-scale patterning

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A new patterning technique for the deposition of sol-gels and chemical solution precursors was developed to address some of the limitations of soft lithography approaches. When micromolding was used in capillaries to pattern precursors exhibiting large amounts of shrinkage during drying, topographical distortions developed. In place of patterning the elastomeric mold, the network of capillary channels was patterned into the substrate surface and an elastomer membrane is used to complete the channels. When the wetting properties of the substrate surfaces were carefully controlled using self-assembled monolayers (SAMs), lead zirconate titanate thin films with nearly rectangular cross-sections were successfully patterned. This technique, called microchannel molding (μCM), also provided a method for aligning multiple layers such as bottom electrodes for device fabrication.

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