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Development of Patterning Technology of TiO₂ on Si(100) Substrate Using a Combined Method of MOCVD and Micro-contact Printing

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We have developed the new patterning technology of TiO₂ on silicon substrates using a combined method of thermal MOCVD and micro-contact printing. TiO₂ thin films were selectively deposited on patterned Si(100) using a single molecular precursor by combining MOCVD (Metal-Organic Chemical Vapor Deposition) and SAMs (Self-Assembled Monolayers). SAMs on Si(100) substrates were made using microcontact printing method of OTS (octadecyltrichlorosilane) on a PDMS stamp. Depending on line widths of the OTS SAMs, in this study, we found that two different film growth rates with increasing deposition widths of the TiO₂ films were observed. Up to 4μm, the thickness of deposited film depends upon the uncovered width by OTS SAMs, but over 4μm the film growth rate is constant. SEM and AFM images showed that the edge shapes of the deposited TiO₂ correlate with the line widths. Based on our experimental results, it is expected that all oxide materials can be patterned on silicon substrates in micrometer scale that is useful for MEMS applications.