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# Anisotropic Si Etching Condition for Preparing Optically Smooth Surfaces

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A combination of dry and wet anisotropic Si etching has been found to be useful for preparing hexagonal holes having smooth sidewall surfaces. The dry etching defines the main shape, and the subsequent short-time wet etching smoothens the sidewall of the {110} surface. The etchant used is made up of ethylenediamine pyrocatechol and water. The surface roughness is quantitatively investigated for improving the sidewall smoothness. The angular alignment accuracy between the pattern and the crystallographic orientation is found to be important. The triangular etching pit obtained by the dummy etching is used for confirming the crystallographic orientation. The surface roughness of <20 nm Ra is repeatedly obtained. The solid polymer dye microcavity laser is fabricated as a replica of the Si structure obtained. The lasing spectra from microcavities show the higher Q value.