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Transformation of curved zones during thermal migration through a silicon plate {100}

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The transformation of an aluminum-based annular zone into a square one was experimentally detected during thermal migration in silicon in the direction <100>. During migration, the square zone exhibits synchronous convergence of the sides of the square and forms a closed epitaxial channel of pyramidal shape in the silicon wafer. This transformation is explained by the asymmetry of the dissolution front of the liquid zone relative to the temperature gradient. The asymmetry is caused by the cutting of the outer contour and the suppression of the cut on the inner contour of the dissolution of the curved zone. The bending of the linear zone leads to a negative curvature of the inner dissolution contour, on which atomic steps are always present, preventing the development of a singular plane of faceting. The deviation of the faceted sections of the curved zone from the temperature gradient is estimated on the basis of a force model that takes into account the vector nature of the resistance forces to movement at the dissolution front of the zones.

Keywords: silicon, thermomigration, curved liquid zones.

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