

Photochemical etching study on (-201) and (010) plane β -Ga₂O₃ single crystal

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Recently, there is great interest in β -Ga₂O₃ with wide bandgap of 4.9 eV and monoclinic crystal structure for the applications of power device, solar-blind UV photodetector, and gas sensors. (-201) and (010) planes of β -Ga₂O₃ are most commonly researched, and their physical, optical and electrical properties depend on the crystal orientations due to the crystalline anisotropy. We report the effect of β -Ga₂O₃ crystal orientation on photochemical etching behavior by using KOH solution. Even though the (-201) and (010) plane β -Ga₂O₃ bulk substrates have the same level of carrier concentration and crystal quality, photochemical etching results showed significantly different etching characteristics. The (-201) planes exhibited the three to four times faster etch rate and different morphology on the etched surface compared to (010) oriented substrate, which is attributed the oxygen dangling bond density on the respective surfaces.