

Atomic Oxygen Sensing Using a Quartz Crystal Microbalance with a Polymer Thin Film Prepared by RF Sputtering

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Polymer thin films, sputtered using a polyimide target on a quartz crystal, were investigated to determine their suitability for application in active oxygen sensors. Active oxygen generated under an inductively coupled plasma (ICP), particularly atomic oxygen radicals with a flux of 6.93×10^{13} atoms/cm²/s, was successfully detected from the frequency shift using a polymer-coated quartz crystal microbalance (QCM). To investigate the reaction mechanism between the polymer surface and atomic oxygen, chemical bonding was evaluated by electron spectroscopy for chemical analysis (ESCA) and surface morphology by atomic force microscopy (AFM). We also compared sputter-coated polymers with spin-coated polymers in terms of their sensing characteristics. We found that a sputter-coated polymer QCM has a great potential for atomic oxygen sensing.

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