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Surface modification of tin oxide by VUV rays and charge particle treatment: An effective method to improve the efficiency of surface catalytic behavior RAJESH GANESAN, Department of Physics and Astronomy, Macquarie University, Sydney, Australia — Plasma processing is a promising method to modify the chemical and physical properties of the semiconductor oxide surfaces. However, the tuning of surface characteristics is also influenced by plasma-emitted VUV and UV radiations. Different combinations of argon and oxygen partial pressures were applied in the capacitively coupled plasma. The highest surface conductivity was achieved with increasing plasma power, which was attributed to the interstitial defects with increased Tamm states created by the following two processes. First, the charge particle bombardment on the oxide surface, which etches the surface atoms and second, the absorption of VUV and UV radiation in the exposed layers of tin oxide nanoflakes scission the covalent bonds connecting the Sn-O atoms. The catalytic behavior of the tin oxide nanoflakes towards reducing gases have been studied as the function of Ar-O partial pressures, plasma power and voltage, and the ambient sensing temperature. Modified surface characteristics were also supported by SEM, TEM and XPS analysis.

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