Electrical Properties of Oriented SnO_2 Thin Films

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Electrical properties of (001) and (110) oriented SnO_2 films with SnO_2 crystallites oriented in the same direction as the rutile TiO_2 substrates, were investigated. The oriented films exhibited relatively low electric conductivities of 10^{-2}-10^{1} Scm^{-1} (carrier concentrations of 10^{18}-10^{19} cm^{-3} and mobilities of 0.3-16$cm^2V^{-1}s^{-1}$) in comparison with polycrystalline films used as transparent conducting coatings. No anisotropy of the conductivity was noticeable in spite of the alignment of the SnO_2 particles along a particular crystallographic axis.

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Gas Pressure Sintered Silicon Nitride Containing Praseodymium Oxide as Sintering Aid

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Pr_6O_{11}-doped Si_3N_4, with or without simultaneous addition of other oxides were fired at 1900°-2050°C under 1 MPa N_2 pressure. In Si_3N_4 containing 15 mol% Pr_6O_{11}, it was assumed that an oxynitride having a structure similar to that of $CeSiO_2N$ is formed at grain boundaries, resulting in highly refractive ceramic without any strength degradation from room temperature to 1300°C. When sintered at above 2000°C, nearly full-dense Si_3N_4 was obtained with 7.5 mol% Pr_6O_{11} and 7.5 mol% Y_2O_3. The sample, having yttrium oxynitrides as grain boundary phases, showed a strength of over 800 MPa at room temperature and of 600-700 MPa at 1300°C. Si_3N_4 with 7.5 mol% Pr_6O_{11} and 7.5 mol% Al_2O_3 a indicated significant strength degradation at 1300°C.

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