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Electronic transport properties of epitaxial SnO_2 (101) on r-plane sapphire substrate by pulsed laser deposition HYOSIK MUN, JISUNG PARK, CHANJONG JU, HOON MIN KIM, USEONG KIM, KOOKRIN CHAR, Seoul Natl Univ, CENTER FOR STRONGLY CORRELATED MATERIALS RESEARCH TEAM — The electrical transport characteristics of epitaxial tin oxide have been investigated in various ranges of the growth oxygen pressure and the film thickness. Pulsed laser deposition has been used to grow epitaxial thin films of SnO_2 or r-plane sapphire substrate. The SnO_2 films are epitaxial with the rutile structure, resulting from the high similarity in oxygen octahedral configurations between the r-plane sapphire surface and the SnO_2 (101) surface. Hall measurements show that the low electron mobility at small thickness region increases gradually when the films become thicker. On the other hand, the carrier concentration increases as the film thickness increases, contrary to the previously reported effect of the line dislocations as donors. The thickness dependence show that the mobility of 2.95 cm^2/V s for 30 nm thickness increases to 97.3 cm^2/V s for 1000 nm thickness and the electron concentration increases from 9.0×10^{17} to 2.4×10^{18} cm^{-3} at the same time. We found the linear and planar defects interrupt electron transport properties of epitaxial tin oxide. We will report on the correlation between the electronic transport properties and the various structural defects in epitaxial tin oxide on r-plane sapphire.

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