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Synthesis, characterization and gas sensing applications of Tungsten Trioxide

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Abstract content
 (Max 300 words)

Tungsten trioxide film was RF-sputtered onto alumina substrates. SEM studies over the sample area (1 cm^2) showed uniform topology while FIB cross-sectioning showed the thickness to vary between $0.75\text{--}1.50\text{ }\mu\text{m}$ and this variation stems from the alumina roughness. The measured film resistance using a two-probe setup was found to be $5\text{ k}\Omega$ at room temperature, and decreased to $2\text{ k}\Omega$ at 300°C which is expected for n-type semiconducting materials. Raman spectroscopy of the films showed Raman shifts at approximately 267 cm^{-1} , 700 cm^{-1} and 800 cm^{-1} which are indicative of tungsten trioxide. The films were used to sense ppm concentrations of NO_2 and NH_3 gas, and it was found that the film gave best response to both gases at 200°C . The film showed higher sensitivity to NO_2 than to NH_3 , presumably due to the adsorption mechanism between sensing an oxidizing gas and reducing gas.

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