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Study of aluminum-doped zinc oxide powders using x-ray diffraction[1] JAMES C. GALLAGHER[2], JAMES B. MILLER, STEPHANIE HSIEH, Dept. of Chermical Engineering, Carnegie Mellon University — Zinc oxide has been proposed as a material for next generation gas sensors. In this study, aluminum-doped zinc oxide powders were synthesized via sol gel chemistry using zinc acetate, aluminum tri-tert butoxide and aluminum acetylacetonate precursors. The aluminum-to-zinc ratio in the zinc oxide powders ranged from 0-5%. The powders were calcined at temperatures from 300°C to 700°C, and their mean crystallite sizes were analyzed using x-ray diffraction. A maximum in mean crystallite size was observed at ≈0.25-1% aluminum, the same composition region for which other researchers have reported a maximum in electrical conductivity. It is also found that adding high amounts (>2% Al:Zn ratio) of aluminum to the zinc oxide can retard sintering at higher temperatures.

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