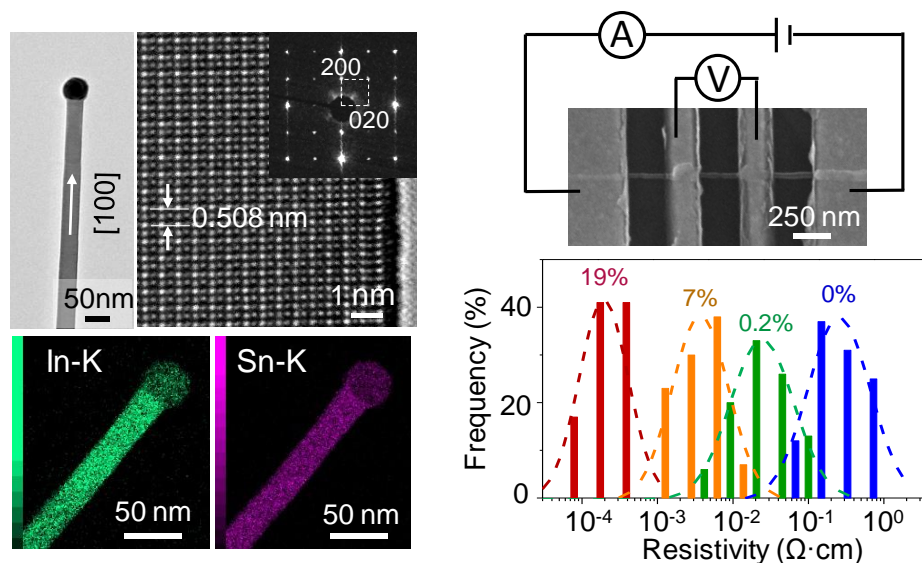


Impact of Preferential Indium Nucleation on Electrical Conductivity of VLS Grown Indium-Tin-Oxide Nanowires

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Highly conductive and transparent indium-tin-oxide (ITO) single crystalline nanowires, formed by vapor-liquid-solid (VLS) method, hold great promise for various nanoscale device applications. However, increasing an electrical conductivity of VLS grown ITO nanowires is still a challenging issue due to the intrinsic difficulty in controlling complex material transports of VLS process. Here we demonstrate a crucial role of preferential indium nucleation on the electrical conductivity of VLS grown ITO nanowires with gold catalysts. In spite of the fact that the vapor pressure of tin is lower than that of indium, we found that indium concentration within nanowires was always higher than the nominal composition. The VLS growth of ITO through gold catalysts significantly differs from ITO film formations due to the emergence of preferential indium nucleation only at a liquid-solid interface. Furthermore we demonstrate that the averaged resistivity of ITO nanowires can be decreased down to $2.1 \times 10^{-4} \Omega\text{cm}$, which is the lowest as the averaged value, via increasing intentionally tin concentration within nanowires.



Reference: Meng et al. *J. Am. Chem. Soc.* 135 (2013) 7033–7038