# [Supplemental Document] Homogenous distribution of dopants in ALD films: tin-doped zinc oxide (ZTO) case study

Triratna Muneshwar,[a,b] Douglas Barlage,[c] Ken Cadien[b]

[a] Synthergy Inc., DICE 9203 116 St, Edmonton, AB, Canada T6G 1H9

[b] Chemical and Materials Engineering, University of Alberta, Edmonton, AB, Canada T6G 1H9

[c] Electrical and Computer Engineering, University of Alberta, Edmonton, AB, Canada T6G 1H9

email: muneshwa@ualberta.ca

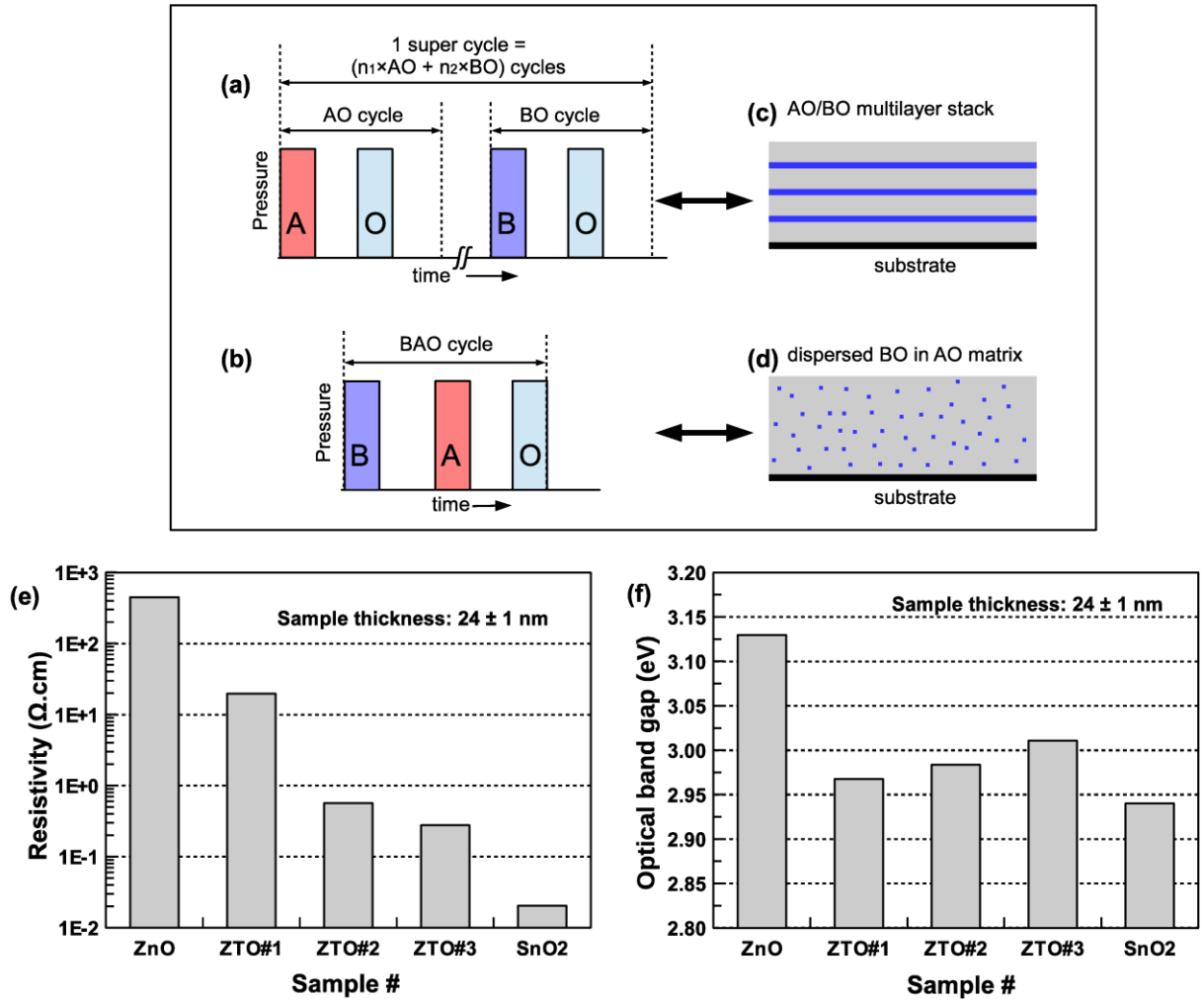


Fig. 1. Schematic of an ALD process utilizing (a) a super-cycle sequence consisting of $n_1$×AO cycles + $n_2$×BO cycles; and (b) BAOBAO… pulsing. These approaches are shown to give (c) multilayered structure with non-homogeneous dopant distribution, and (d) homogeneous dopant distribution. For tin-doped zinc oxide (ZTO) samples #1 - #3 (each 24 ±1 nm thick), deposited with $Sn/Zn/O^{plasma}$ pulsing sequence at 50 °C substrate temperature, electrical resistivity ($\rho^{ele}$) and optical bandgap ($E_g$) are shown in (e) and (f) respectively ($\rho^{ele}$ and $E_g$ for ZnO and $SnO_2$ are added for reference).