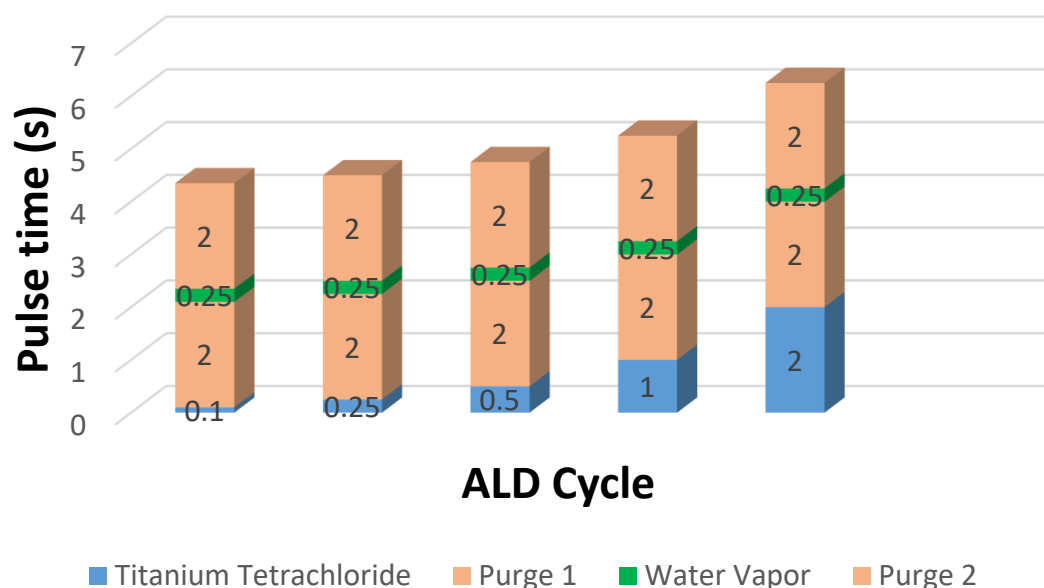
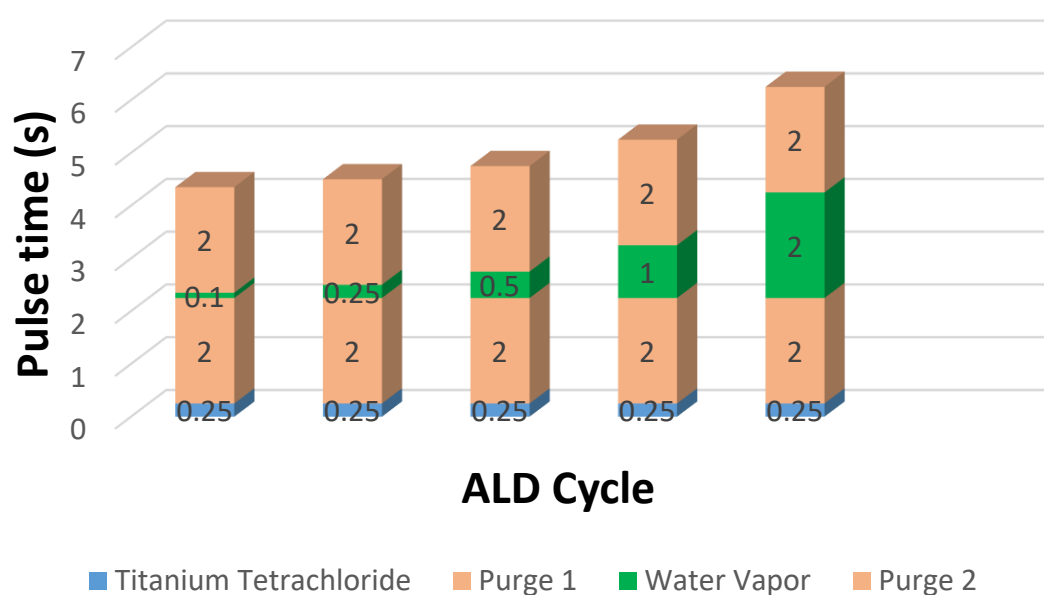
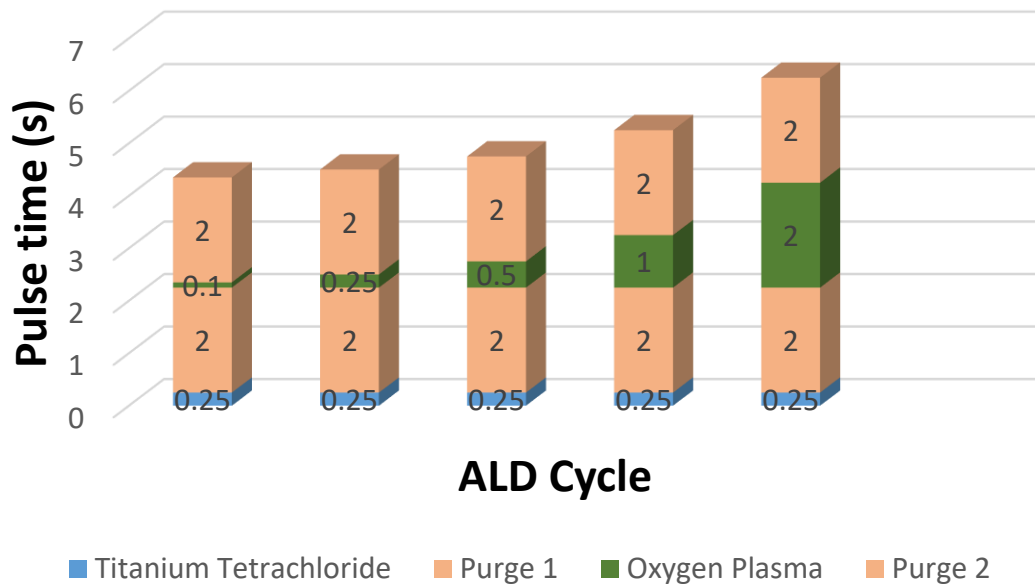


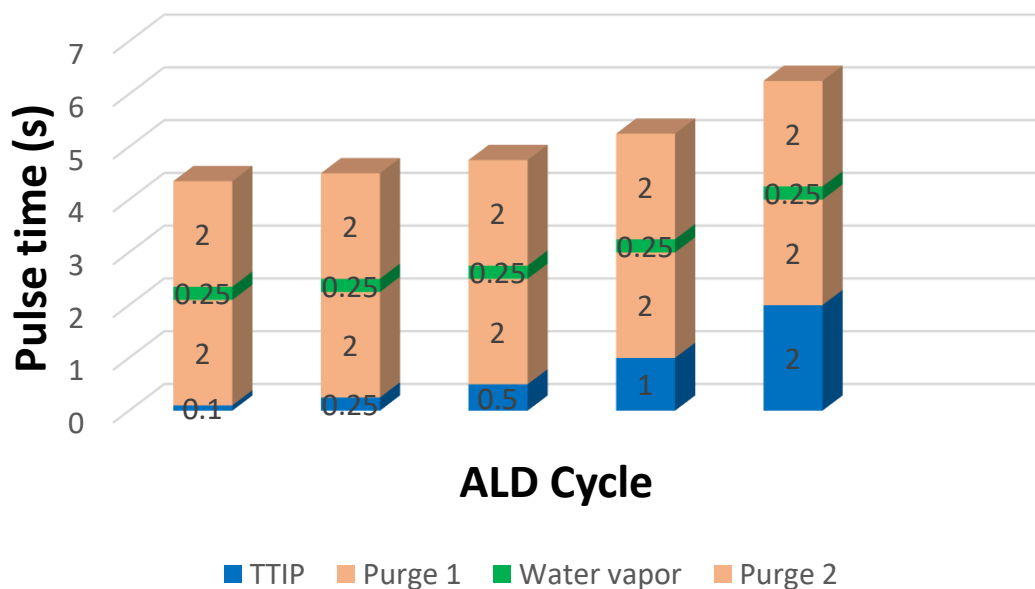
Supplementary Material

A) Pulse time of the TiCl_4 varying and other pulses fixed**B)** Pulse time of the H_2O varying and other pulses fixed

C) Pulse time of the O₂ Plasma varying and other pulses fixed

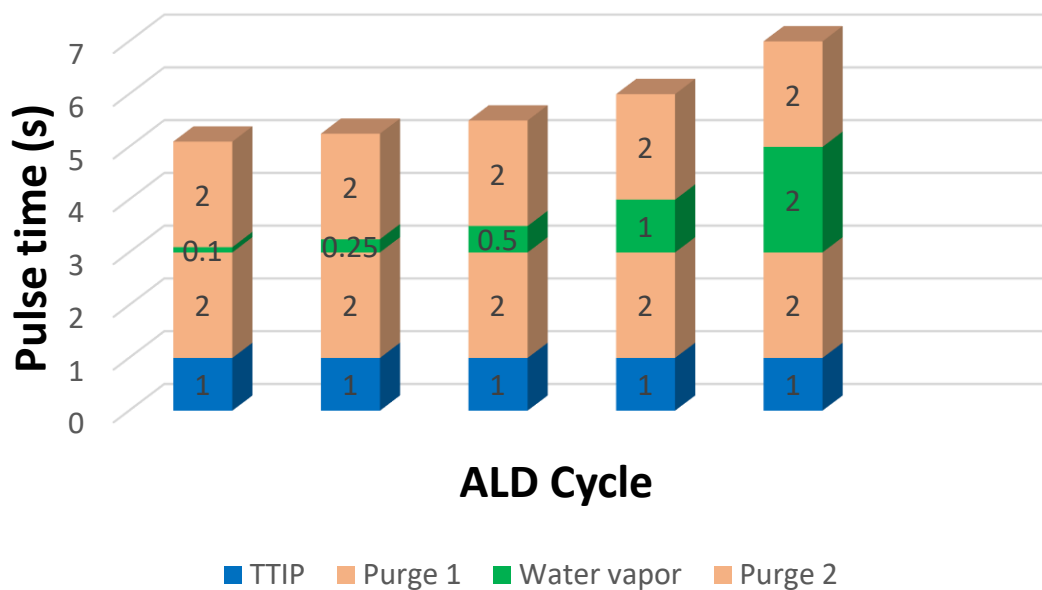


D) Pulse time of the TTIP varying and other pulses fixed



E)

Pulse time of the H₂O varying and other pulses fixed

**F)**

Pulse time of the O₂ Plasma varying and other pulses fixed

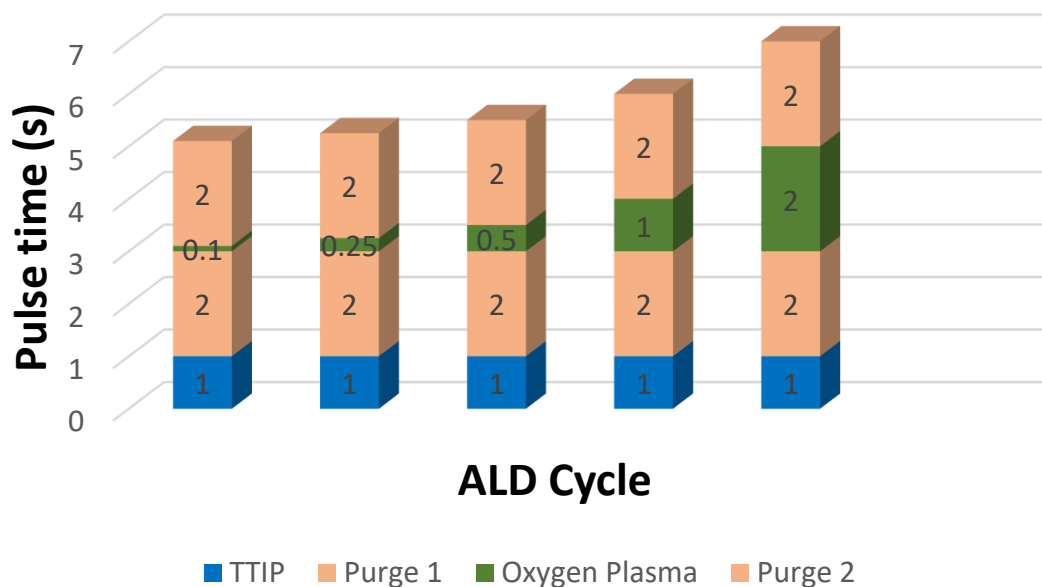


Figure S1: Pulse time (Ti precursor-Purge-Oxidant Precursor-Purge) used to growth TiO₂ thin films with high quality for all cases the temperature was fixed at 250 °C: (A) titanium tetrachloride (TiCl₄) with pulse time varying from 0.1 to 2.0 s, and other pulses fixed, (B) pulse time of TiCl₄ and purge fixed with water vapor pulse time varying from 0.1 to 2.0 s, (C) pulse time of TiCl₄ and purge fixed with O₂ plasma pulse time varying from 0.1 to 2.0 s, (D) titanium isopropoxide (TTIP) pulse time varying from 0.1 to 2.0 s, and other pulses fixed, (E) pulse time of TTIP and purge fixed with water vapor pulse time varying from 0.1 to 2.0 s, and (F) pulse time of TTIP and purge fixed with O₂ plasma pulse time varying from 0.1 to 2.0 s.

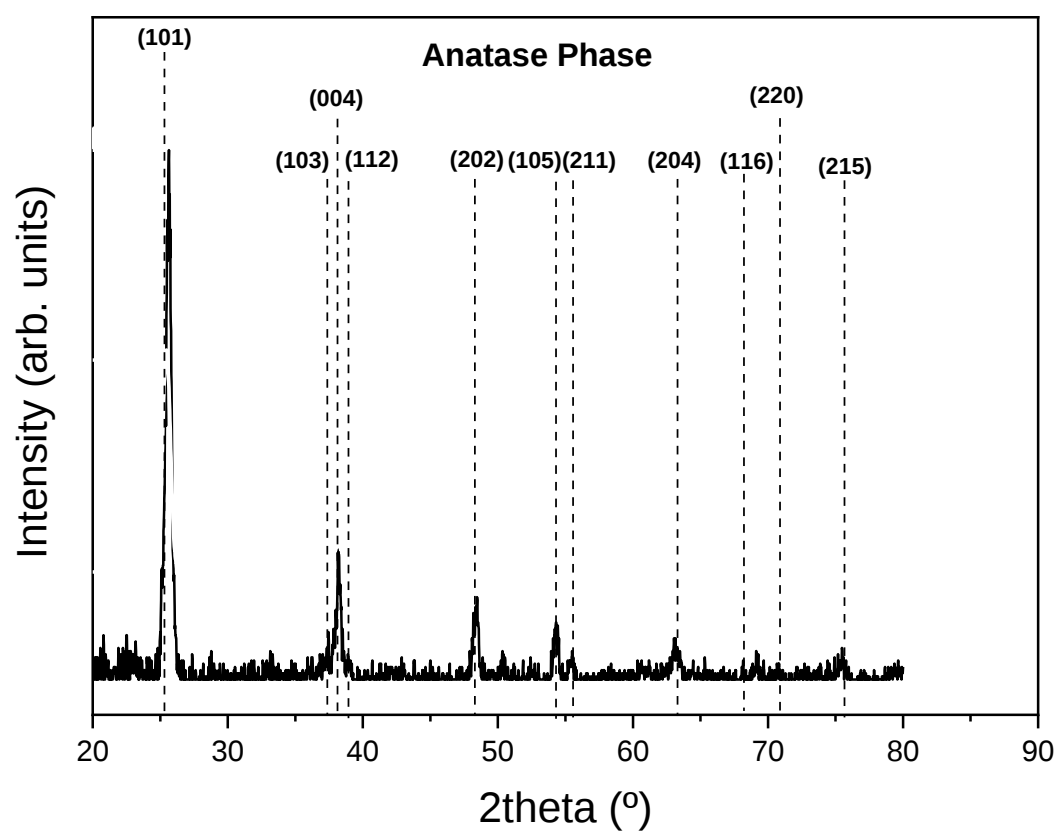


Figure S2: GIXRD diffractogram for TiO₂ films and all peaks anatase according to powder diffraction file (JCPDS:21-1272).