

Figure 1: Schematic illustration of the ABC-type ALD cycle that was used to achieve area-selective TaN ALD. In step A, aniline is dosed as inhibitor and selectively adsorbs on the transition metal non-growth area. In step B, tert-butyylimidotris(dimethylamino)tantalum (TBTDMT) precursor is dosed, which adsorbs on the growth area but is blocked on the non-growth area by the adsorbed inhibitor molecules. In step C, the substrate is exposed to the Ar-H₂ plasma co-reactant which removes the aniline and precursor ligands from the surface.

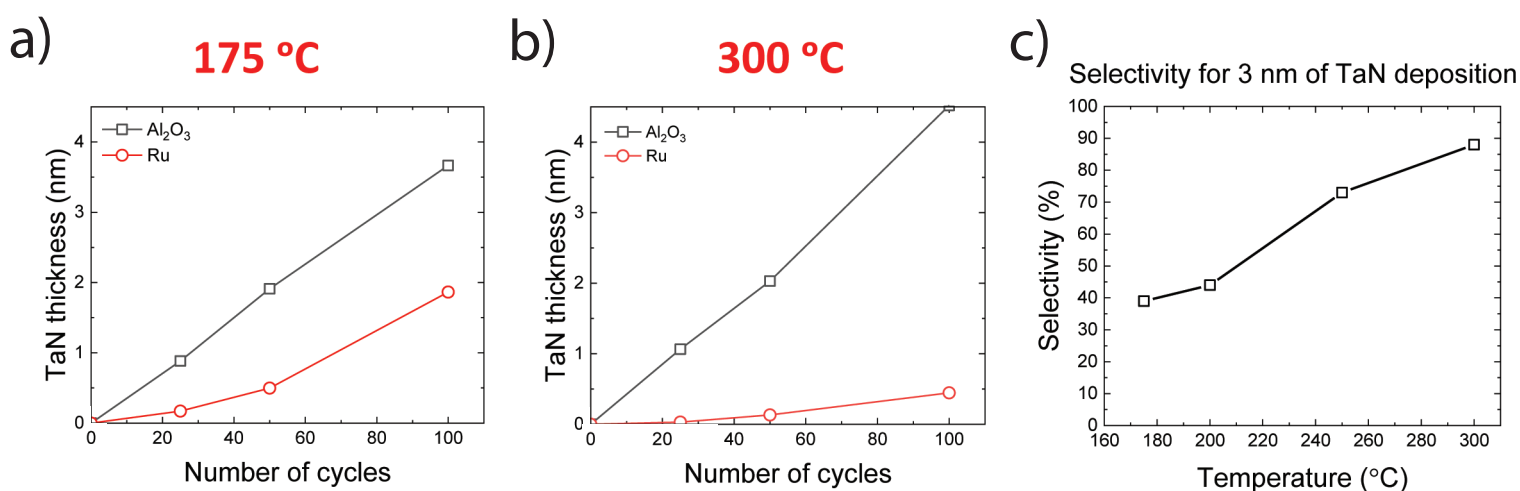


Figure 2: Deposited TaN film thickness by the ABC-type TaN process on Al₂O₃ and Ru substrates at a substrate temperature of a) 175, and b) 300 °C, as derived from XPS. c) Selectivity as function of substrate temperature for area-selective TaN ALD when depositing a 3 nm TaN film on a Al₂O₃ growth area with respect to a Ru non-growth area.

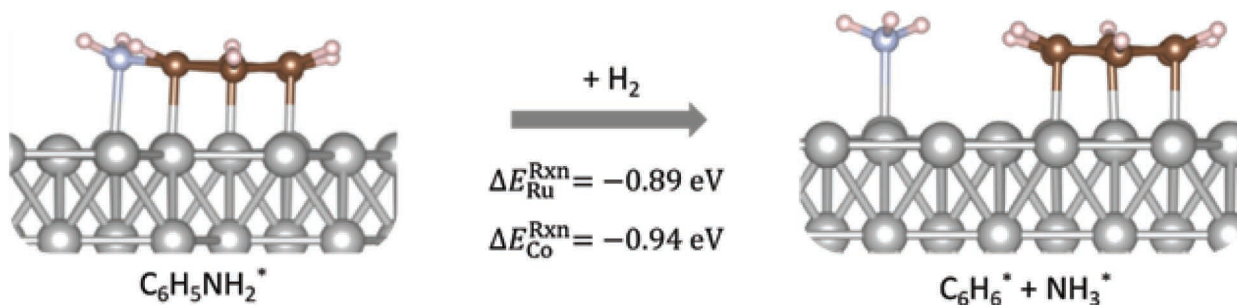


Figure 3: DFT results on aniline hydrogenolysis on Ru(0001) and Co(0001) where the amine group of the adsorbed aniline splits off resulting in ammonia and benzene.