

Role of Hydrogen Chloride in Atomic Layer Deposition of TiO₂ Thin Films from Titanium Tetrachloride and Water

Yinshi Li, 박인혜, 임지나, Wenhao Zhou, 민요섭*
건국대학교 화학공학과
(ysmin@konkuk.ac.kr*)

Atomic layer deposition (ALD) of TiO₂ thin films has been intensively studied by using TiCl₄ and H₂O as Ti and O precursors, respectively. In the growth of TiO₂ via ALD chemistry between TiCl₄ and H₂O, it is believed that gaseous HCl molecules are evolved as a byproduct in both the first- and the second-half reactions. However the role of HCl is not clear yet while several groups have investigated the growth mechanism of TiO₂ thin film by using various in situ monitoring techniques and theoretical simulations. In this work we have performed modified ALD sequences in which exposure and purging steps of gaseous HCl molecules were intentionally inserted in the typical sequence of TiCl₄ exposure - purging - H₂O exposure - purge after the first- or the second-half reactions. We discuss the role of HCl and contributions of various chemisorbed species by comparing the growth behaviors of TiO₂ in the typical and modified ALD sequences.