

Abstract Submitted
for the MAR08 Meeting of
The American Physical Society

A STM study on temperature-dependent adsorption of H₂O on Si(001) SANG-YONG YU, HANCHUL KIM, JA-YONG KOO, KRISS, KRISS TEAM — We studied the temperature dependence of water molecule adsorption on the Si(001)-2×1 surface by using Scanning Tunneling Microscopy. The water molecules are known to dissociate during the adsorption on Si(001) and form Si-H and Si-OH bonds. Recently, we demonstrated that they are two adsorption configurations: ID (inter-dimer) and OD (on-dimer). These two configurations show population ratio of $n(\text{ID})/n(\text{OD}) \sim 5$ at Room Temperature. In order to understand the adsorption kinetics more thoroughly, we have measured $n(\text{ID})/n(\text{OD})$ by varying the sample temperature from 300K to 870K. It is found that $n(\text{ID})/n(\text{OD})$ show strong temperature dependence, and it even becomes smaller than 1. The cross-over temperature is at around 470K.

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Date submitted: 27 Nov 2007

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