

Initial growth of water crystal on Ru (0001): Influence of the water fragments

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The initial growth of water crystal to form the first bilayer and multilayers on Ru(0001) has been studied by infrared reflection absorption spectroscopy (IRAS) and temperature programmed desorption (TPD). Our study was inspired by the new proposal put forward by Feibelman^{1,2} suggesting that half of the water molecules needed to form the first layers on transition-metal surface would dissociate on a Ru(0001) surface.

Cycles of D₂O “adsorption (25K) – desorption (up to 235 K)” were used to study the influence of the remaining species on the ice-like bilayer formation.

A decrease of the ice-like bilayer desorption peak position and a gradual change of the desorption peak shape (loss of the shoulder) were observed after few cycles (Fig.1).

Recombinative D₂O desorption and hydrogen (D₂) desorption (following a one “adsorption (25K) – desorption (up to 235 K)” cycle) were further observed at T > 235K.

These results, give the evidence that a small amount of water (D₂O) went through dissociation during deposition and /or annealing. We report herein the influence of remaining water fragments on the formation of the two first layers of water.

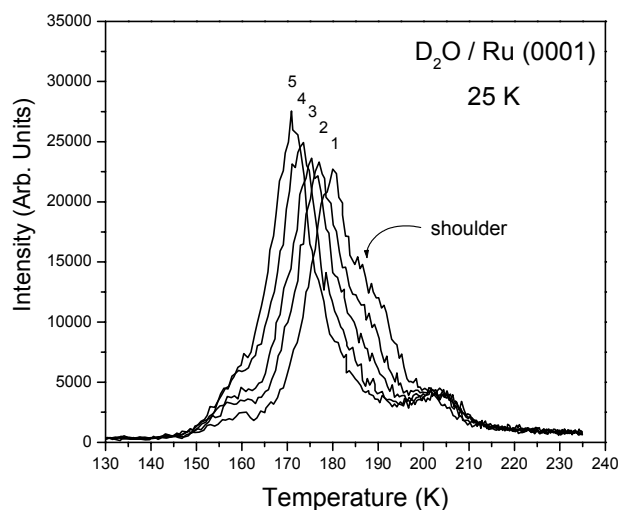


Fig.1: TPD spectra of D₂O adsorbed at 25 K on Ru(0001). In each case an amount of water corresponding to the formation of one bilayer was deposited.

References

- [1]: P. J. Feibelman, Science 295, (2002), 99.
- [2]: Dietrich Menzel, Science 295, (2002), 58.

