Historical Context

• In the 1970’s, …was adsorption of water…
  – Molecular or dissociative?
  – H-down or O-down?
  – Hydrogen bonding?
EVIDENCE FOR THE CONFORMATION OF H₂O ADSORBED ON Ru(001)

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The electron stimulated desorption ion angular distributions (ESDIAD) method has been used to study the adsorption of H₂O by Ru(001). The results indicate that chemisorbed, undissociated H₂O is bonded to Ru via the oxygen atom, and that interactions between neighboring molecules occur as coverage increases. The utility of ESDIAD for structure determination in the absence of long range order is demonstrated.
Shortly after:

2 papers on Water + alkali metals Na, Li
TDS (= TPD)  
ESDIAD
Monolayer and multilayer adsorption of water on Ru(001)\(^a\)

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The properties of H\(_2\)O adsorbed on Ru(001) at 95 K have been studied using a variety of techniques. The geometrical properties of the overlayer, deduced from low-energy electron diffraction and electron stimulated desorption ion angular distributions, indicate that layered, hydrogen-bonded clusters of H\(_2\)O molecules form which have specific orientation with respect to the hexagonal metallic substrate. The vibrational, electronic, and thermodynamic properties of the first two layers of H\(_2\)O admolecules are distinct from the properties of ice multilayers. At an adsorption temperature of 165 K, only the first two layers adsorb, and the H\(_2\)O lattice is more ordered than at 95 K, which is an effect analogous to the irreversible vitreous-to-cubic phase transition which occurs at approximately this temperature in bulk ice. Off-specular scattering measurements have resolved overlapping vibrational features with different angular distributions of intensity.
THE INTERACTION OF WATER WITH SOLID SURFACES:
FUNDAMENTAL ASPECTS

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The Interaction of Water with Solid Surfaces: Fundamental Aspects

The Interaction of Water with Solid Surfaces: Fundamental Aspects Revisited

Michael A. Henderson
Pacific Northwest National Laboratory

Surface Science Reports
46 (2002) 1-308
Citations in Each Year

1300 citations to date.
Dear Pat, Jim and Amanda,

Thanks very much for your warm hospitality during my visit. I thoroughly enjoyed my stay with you - our interesting conversations, the discussions with your colleagues at ISU, the dinner with your group, the work on the prospective book, and the VEISHEA weekend (complete with brats, cherry pies, the distant sound of "Farm Aid", and Pippin)! I saw it all! Of course, the high point of the trip was meeting Amanda for the first time. She's a sweetheart!

With warm memories,

Ted