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On the question of the stability of water layer on Ru(0001): electron-activated dissociation N.S. FARADZHEV, T.E. MADEY, Physics Department, Rutgers University, K.L. KOSTOV, P. FEULNER, D. MENZEL, Physik Department, TU Muenchen, Deutschland — There exist diverse and conflicting views on the stability of first molecular layer of water on the Ru(0001). Here we report the effect of electron irradiation on the rate of H_2O and D_2O dissociations when they adsorbed on ruthenium surface at low temperature (T$\leq$100K). Our results show clearly that a molecular D_2O layer wets the surface and is thermally stable up to desorption. H_2O dissociates partly at elevated temperature to an extent which depends strongly on the exact heating procedures. Electron impact leads to partial dissociation of both H_2O and D_2O with extremely high cross section (e.g. $\sim 10^{-15}$ cm^2 at 90 eV), and even electrons of very low energy (down to even 1 eV) are effective. We conclude that many reports on the system such as the LEED $I-V$ analysis of D_2O geometry by Held and Menzel and others have been influenced by the partial dissociation induced by slow electrons, and/or impurities in the layers. The results of DFT calculations concerning the stability of the adsorbed H_2O layer have to be viewed and interpreted with caution.

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