

1 Spectroscopic evidence for the partial dissociation of H₂O on ZnO(10 $\bar{1}$ 0) 1

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10 The interaction of water with the non-polar ZnO(10 $\bar{1}$ 0) surface has been studied by high 10
resolution electron energy loss spectroscopy (HREELS) and thermal desorption spectroscopy
(TDS). Adsorption of water at room temperature leads to the partial dissociation of water
molecules giving rise to a well defined (2 × 1) superstructure. This observation was confirmed by
the HREELS data which show the water-induced O–H stretching modes at 396 and 460 meV
15 (3193 and 3709 cm⁻¹) as well as the peak at 456 meV (3677 cm⁻¹) arising from the OH species. 15
The large red shift of the loss at 396 meV indicates unusually strong hydrogen bonding
interactions of water to both neighbouring adsorbate molecules and the surface O atoms which
are responsible for the partial dissociation of water molecules on the perfect ZnO(10 $\bar{1}$ 0) surface.