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Photocatalytic Reactions on Graphite/Ice Interface DINKO

CHAKAROV, Department of Applied Physics, Chalmers University and Göteborg University, 412 96 Göteborg, Sweden, JOHAN BERGELDT, BENGT KASEMO — Photocatalytic splitting of water was investigated as function of photon energy and structure and thickness of ice films grown on graphite basal plane in UHV at temperatures between 35 and 150 K. While the water ice films are transparent for photons with wavelength longer than 190 nm, the strong absorption in the uppermost layers of graphite substrate generates energetic charge carriers that drive photoreactions at the graphite/ice interface. Similar schemes have been demonstrated and investigated before in the monolayer regime (ML)[1]. New elements here are (i) confinement of the precursors and the reaction products at the interface by relatively thick ice “cap” and (ii) possibility to control ice reactivity and permeability for reaction products by altering its structure. The most striking difference is formation of molecular oxygen, a product not observed in monolayer regime. For ice films with polycrystalline structure and thicker than ~ 35 ML only hydrogen defuses from the interface into vacuum, while the oxygen and CO/CO₂ remain trapped under the ice. Release of these products takes place at elevated temperatures or if the ice films remain amorphous and porous (as deposited at low temperatures). [1] M. Gleeson, B. Kasemo, and D. Chakarov, *J. Chem. Phys.*, **115**, 9477; **119**, 6753. .

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