33－32 Formation of the "nanotube" structure of β-cyclodextrin on Au (111) surfaces induced by potential controlled adsorption

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The self-organization of β-cyclodextrin (β-CyD) into a "nanotube" structure, similar to that of CyD-polyrotaxane, was found to be induced by potential controlled adsorption on Au (111) surfaces in sodium perchlorate solution without a threaded polymer. In-situ scanning tunneling microscopy (STM) revealed that the cavities of β-CyD faced sideward not upward in the tubes. This ordered structure can form only under conditions where the potential is controlled (-0.45 V to -0.25 V vs. SCE). β-CyD molecules were in a disordered state on bare Au (111) surfaces without potential control (+0.00 V vs SCE). And, the desorption of β-CyD from Au surfaces was observed at a negative potential of less than -0.60 V. In the range -0.45 to -0.25 V, β-CyD molecules formed ordered arrays on Au (111) surfaces. Furthermore, the discontinuity of potential control led to disordered phases and the destruction of the "tube" structure. This indicates that by controlling the electrode potential a delicate balance of various interactions can be achieved, resulting in the self-organization of molecules on the surface.

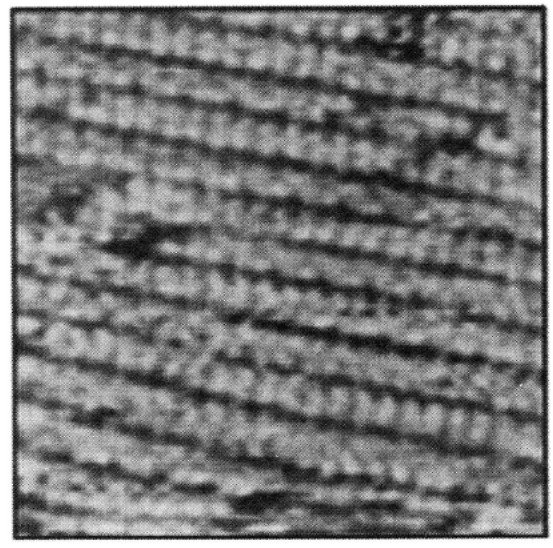

Figure. An high resolution STM image of "nanotube" structures of β-CyD on Au (111) surfaces. (10×10nm)

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