PTCDI-C_8 adsorption on GaN surface

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Growth of organic nanostructures on semiconductor surfaces offers variety of applications in modern electronic. This method of functionalization of semiconductors will provide a foundation for the engineering of the production of new semiconductor devices. Significant phenomenon is the self-organization of molecules, therefore mechanisms of growth and the properties of organic-inorganic interfaces are the subjects of intensive studies.

Due to intrinsic optical and transport properties PTCDI-C8 (N, N'-Dioctyl-3,4,9,10-perylenedicarboximide) molecules are very promising materials for applications in organic solar cells and organic thin film transistors. Gallium nitride as a wide gap semiconductor with special properties for applications in optoelectronic seems to be a very interesting substrate for studying adsorption of organic molecules in order to check its applicability in the hybrid systems engineering.

Mechanisms of PTCDI–C_8 adsorption and thin films growth on n-GaN and p-GaN surfaces have been studied using a combination of X-ray photoelectron spectroscopy (XPS) and scanning tunneling microscopy (STM). The STM results show that under certain conditions molecules form a characteristic islands (Fig. 1). XPS spectra indicate a weak adsorbate-substrate interactions, which allow self-organization.

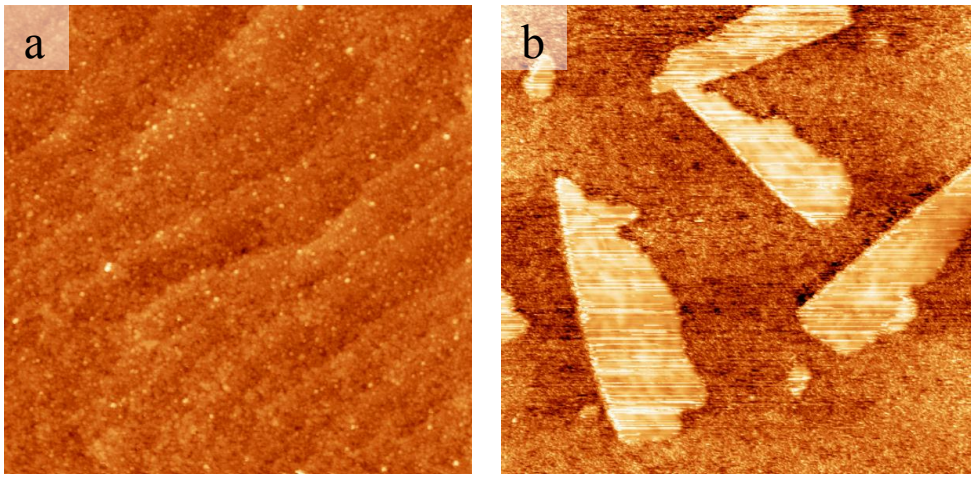

Fig. 1. STM images: (a) of the clean p-GaN(0001) surface (400 nm × 400 nm, V_s = 4.9 V, I = 1.1 nA); (b) after deposition of PTCDI–C_8 molecules on the p-GaN(0001) surface (410 nm × 410 nm, V_s = 4.7 V, I = 1.8 nA).