Progress report

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1. Purpose:

A deep understanding of electronic structures at the interface of organic/ organic, organic/ metal and organic/ insulator is essential for the improvement of the organic electronic devices. While the organic/ metal interfaces are well documented, the electrical properties at organic/ insulator and organic/ organic interfaces are still unclear. Although the interfacial dipole generated is known to shift the vacuum level (VL), the origin of the dipole is the subject that remains unsolved.

2-1. Previous work:

a. It is found that the origin of the interfacial dipole at organic/ insulator can be explained by polarization induced by surface charge of insulator substrates.

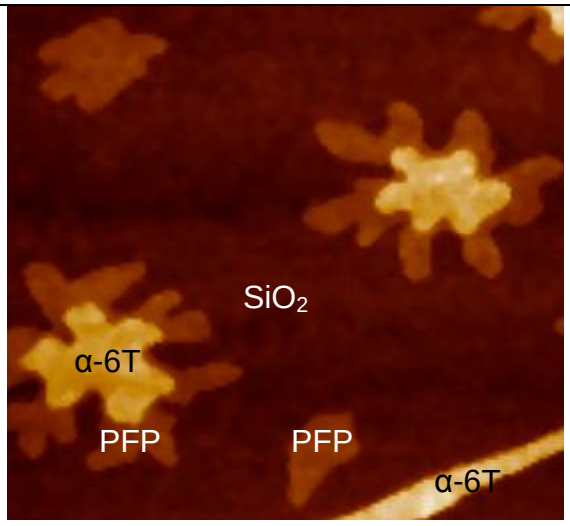
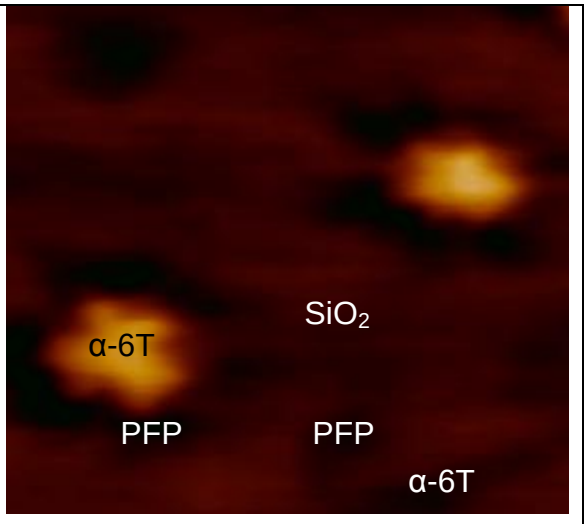
b. α-6T and PFP experiment shows that the ideal about the interaction between molecules with different lengths might be explained by partial charge transfer and polarization. The upper part of α-6T molecules is charged less positively than lower part from which electrons are drawn by PFP. In PFP molecules, the dipole with the orientation from the surface to the molecule is generated due to the charge redistribution. Positively charged hydrogen atoms on the OH-terminated surfaces are thought to induce this charge distribution in molecules.

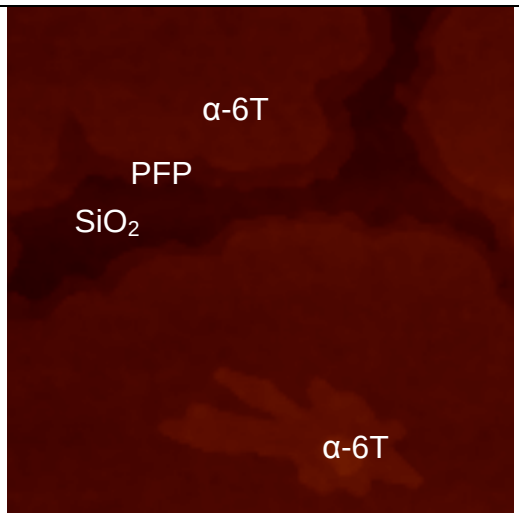
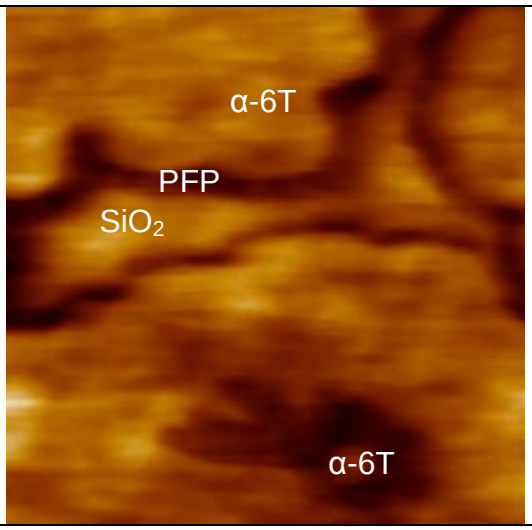
2-2. Question

At the interface between α-6T and PFP, potential drop was observed. This potential drop should be originating from electrostatic potential induced with dipole between α-6T and PFP. Here we would like to know the change of electrostatic potential with α-6T coverage.

3. What I did:

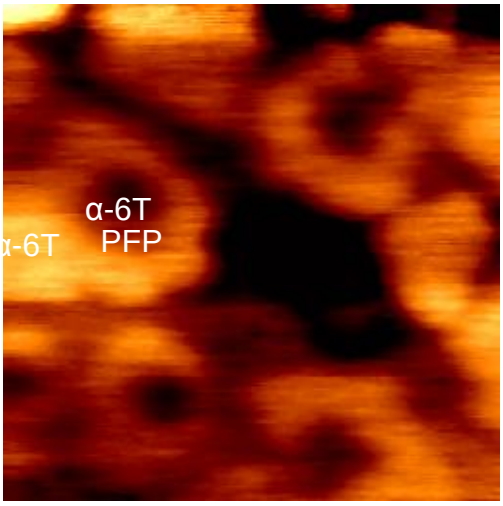
a. We obtained the KPFM images of heterojunction of molecules with change of α-6T coverage.

Small coverage		

Large coverage		

In thin film of α-6T, the potential drop at α-6T and PFP interface was observed. On the other hand, as α-6T coverage increases, the potential drop vanishes (the voltage difference between α-6T and PFP in the small coverage case is about 1.7-2.7V whereas in the large coverage is only about 0.07-0.13V)

b. The change of dipole in first layer of α-6T with second heterolayer of α-6T and PFP was obtained. It could be due to the decrease of electrostatic potential induced by dipole of first layer.



4. Future work:

I still don't really understand the way to interpret KFM image. I am reading more about it. I would continue the large coverage case in PEN/PFP experiment.