# The Surface Science of Adsorption on Crystalline Ferroelectric Polymer Surfaces*

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Surface science studies of polymers surfaces are surprisingly limited despite the increasing application of polymers in biomedicine and polymer device electronics. For example, unlike water adsorption on metal surfaces (and the formation of ice), which has been an extensively studied, there is no equivalent body of literature for gas-surface interactions at polymer surfaces.

We detail some adsorbate interactions with the ferroelectric copolymer poly(vinylidene fluoride (PVDF) – trifluoroethylene (TrFE)) and other related organic surfaces. The surface science studies were possible because the PVDF-TrFE polymer system fulfills some general conditions: the polymers are (1) ultrahigh vacuum compatible, (2) the surfaces of the polymers are crystalline with well defined structure and orientation, (3) the polymer films can be grown thin and uniform so that the substrate surface can be prepared without pinholes.

The interface dipole interactions may also affect organic device properties. For example, from our studies, we find that the dipole interactions are implicated at the interface between metal phthalocyanines and poly(vinylidene fluoride with trifluoroethylene), thus affecting the band offsets and the diode properties. The interface dipole interactions could affect the resulting hetero-organic diode properties in several ways. The local electric field due to the P(VDF-TrFE) could align the induced metal phthalocyanines dipoles and either change the molecular orientation(s) or change the molecular dipole alignment(s) at the interface, as is suggested by the changes in metal phthalocyanines molecular band offsets on PVDF. A change in molecular orientation or interface dipole at the PVDF/metal phthalocyanines heterojunction could lead to a decrease or increase in the barriers to current. Generally, the manipulation of interface dipoles can be exploited to fabricate novel organic electric devices with some rather novel properties, as will be demonstrated.

* Work undertaken with L. Rosa, J. Xiao, Z. Zhang, P. Jacobson, C. Ilie, J. Zhang, Ya.B. Losovyj and I. Yakovkin. This work was supported by the National Science Foundation through grants CHE-0415421, CHE-0650453, CHE-0909580