Understanding heterostructures with the help of high energy photoemission spectroscopy

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It is in general difficult to probe directly the nature of interface states of any heterostructured material due to the fact that these are typically buried under a depth and represent a very small volume fraction of the entire sample. We have shown in recent times that x-ray photoelectron spectroscopy with a widely tunable photon energy can be used very effectively to obtain spatially resolved electronic structure information, thereby making it the ideal probe to investigate interface properties in diverse heterostructured systems, such as $LaAlO_3$-$SrTiO_3$, magnetic tunnel junctions with CoFeB and MgO, and optically active highly luminescent semiconductor nanoparticles. I shall discuss some of these results in this talk.

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