Electron Correlation and Charge Transfer in (Ba_{0.9}Nd_{0.1})CuO_{2+\delta}/(CaCuO_{2})_2 Superconducting Superlattices Observed with Resonant Inelastic X-ray Scattering BYRON FREELON, LBL — In-plane CuO_2 physics of the 2×2 high-Tc superlattice (Ba_{0.9}Nd_{0.1}CuO_{2+\delta})_2/(CaCuO_{2})_2 was investigated by applying x-ray emission/absorption spectroscopy. The superlattices are fabricated by pulsed-laser molecular beam epitaxy (MBE) in a layer-by-layer fashion. The superlattices consist of two layers; an infinite layer (IL) and the charge reservoir (CR). Each insulating layer is alternately deposited to produce superlattices exhibiting a T_c of 80K. We measure the O 1s density of states to be insulating for the component layers and metallic for the superlattice. Using resonant inelastic scattering (RIXS) we make the first direct observation of Zhang-Rice singlets in artificial high-temperature superconducting heteroepitaxial structures. Zhang-Rice singlet polarization dependent studies are performed, and the absorption and emission results are compared to local-density approximation theory. X-ray emission spectra of the superlattice and its component layers gives evidence of charge transport from the charge reservoir to the infinite layer. Cu-edge resonant x-ray emission is performed to probe dd excitations in the component layers and superlattice.