Abstract Submitted
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Ultrafast x-ray absorption in NiO studied using femtosecond laser plasma hard x-ray pulses[1] MZAHAR IQVAL, MUHAMMAD IJAZ ANWAR, Gwangju Institute of Science and Technology, KAROL JANULEWICZ, Military University Warsaw, DO YOUNG NOH, Gwangju Institute of Science and Technology — NiO is a wide band gap and typical antiferromagnetic material having highly correlated electronic system. In this contribution, we present the effect of excitation of valence electrons in NiO by femtosecond laser pulse on the response of the core shell electrons using a femtosecond laser plasma X-ray source. NiO (4 μm thick) was pumped with a fluence of 10 mJ/cm^2 of NIR pulse in 50 fs. X-ray absorption spectra were registered at various time delays with respect to the probe pulse. A sudden shift of K absorption edge to lower energy was observed followed by the quick recovery when electrons are excited with 1.55 eV (800 nm) possibly to the in-gap states. The shift occurred at the rate of 223 $\pm$ 3 fs, and a maximum of $\sim$ 3 eV red shift of K- absorption edge was registered after 400 fs of excitation. On the other hand upon pumping with the combination of NIR and UV (800 nm and 400 nm) an abrupt blue shift of K-absorption edge was recorded after $\sim$ 400 fs at the rate of 234 ± 5 fs. This is possibly due to the filling of the lowest unoccupied orbital above the band gap in the conduction band.

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