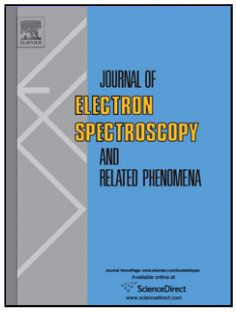

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X-ray absorption, photoemission and electron spin resonance studies of Ar^+ ion implanted ZnO

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Highlights

- Increase of Zn L_3-edge and O *K*-edge intensity indicates the increase of local density of states.
- Increase of density of states is due to the surface defects and/or dangling bonds in ZnO.
- The Zn $2p_{3/2}$ core level XPS studies confirm the formation of oxygen vacancies/defects.
- Room temperature ferromagnetism is due to vacancies/defects.

ABSTRACT

Defect induced room temperature ferromagnetism (RT-FM) in Ar^+ implanted ZnO single crystal (ZnO-SC) is observe from the electron Spin Resonance (ESR) spectra and is correlated with their electronic structure studies using synchrotron radiation based X-ray absorption near edge structure (XANES) spectroscopy and valence band photoemission spectroscopy (VB-PES). Enhancement of absorption intensity at the edge of XANES spectra of Ar^+ implanted ZnO indicates the increase of local density of states (DOS); which arises from the surface defects and/or dangling bonds in ZnO. VB-PES spectra change upon Ar^+ implantation, becoming broader, implying the induced surface defects in ZnO-SC. X-ray photoelectron spectroscopy studies confirm that the Zn $2p_{3/2}$ core level peak