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**XPS Observations of Crystal Field Splitting in $TiO_2$ Thin Films in Quantum Confinement Approach** NATALYA SUSHKOVA, LAB MKS — Transition metal oxides attract increased interest due to amazing electrical and magnetic properties and their outstanding applications designated by relative d-band redistributions that are shifted in such a way that narrow bands arranged by localized electrons are situated in the vicinity of $E_F$. Different kinds of lattice distortions caused by doping and/or quantum size confinement of TM oxides are assigned to remarkable phenomenon Mott metal-insulator transitions, when mutual metal-oxide orbital arrangement changes dramatically. There is a widespread consensus that strong electron correlations are responsible for that change and magnetic excitation is one of manifestations of these correlations. Here we are presenting XPS study of titanium dioxide nanocrystal formations on silicon substrate with native oxide. The dynamic changes in XPS spectra were used for analysis of $TiO_2$ thin films with mass thicknesses up to 2 monolayers formed by redox reactions of sputtered Ti on Si(100) substrate with native oxide implemented *in situ* under UHV conditions. XPS spectra evolution, as a traditional source of information on phase composition, was complemented by the possibility to estimate the morphology and crystal field splitting of formed precipitates. Intensity fluctuations observed for O1s, Si 2p, Ti2p spectra were accompanied by crystal field splitting in Ti2p and on second derivatives of O1s. These fluctuations were followed by noticeable changes in the vicinity of band gap indicating possible Mott metal-insulator transitions.

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