Serbian Ceramic Society Conference
ADVANCED CERAMICS AND APPLICATION XI
New Frontiers in Multifunctional Material Science and Processing

Serbian Ceramic Society
Institute of Technical Sciences of SASA
Institute for Testing of Materials
Institute of Chemistry Technology and Metallurgy
Institute for Technology of Nuclear and Other Raw Mineral Materials

PROGRAM AND THE BOOK OF ABSTRACTS

Serbian Academy of Sciences and Arts, Knez Mihailova 35
Serbia, Belgrade, 18-20. September 2023.

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Epitaxial oxides on semiconductors: growth perspectives and device applications

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Epitaxial integration of transition metal oxides with semiconductors offers various phenomena for novel device applications, specifically bringing ferroelectric, ferromagnetic, electro-optic, photocatalytic, multiferroic, piezoelectric and other properties to the well-established silicon platform. A convenient way of integrating functional oxides with Si(001) substrate is through a $SrTiO_3$ (STO) intermediate layer, which can be fabricated on Si(001) in epitaxial form and with high crystallinity using.
The epitaxial growth of functional oxides on silicon substrates requires atomically defined surfaces, which are most effectively prepared using SrO- or Sr-induced deoxidation and passivation. As-prepared surfaces enable overgrowth with various oxides for novel device applications. In our work pulsed laser deposition (PLD) was used to integrate oxides with silicon. We showed the ability to prepare highly-ordered sub-monolayer SrO- and Sr-based surface structures, including two-domain (2×3)+(3×2) pattern at 1/6 ML Sr coverage as determined by the reflection high-energy electron diffraction (RHEED) technique. On the passivated silicon surface epitaxial layers of STO was grown by the method of kinetically controlled sequential deposition. Detailed study of initial deposition parameters proved to be extremely important in achieving epitaxial relation of STO with the underlying substrate. On as-prepared pseudo-substrate different functional films were gown for applications in microelectromechanical systems and electrochemical devices.