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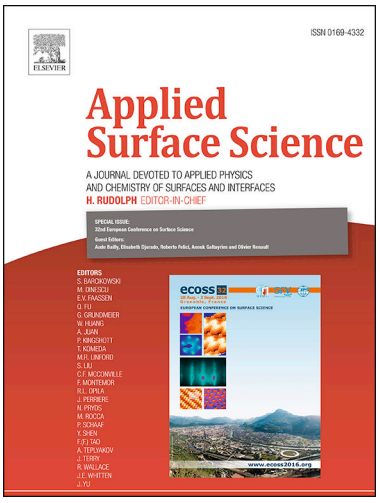


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# Multi-stage pulsed laser deposition of high quality epitaxial ultra-thin $SrTiO_3$ on Si substrates

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**Abstract**

The integration of complex oxides with silicon represents a challenging task in materials science today, given the thermodynamic, chemical and structural incompatibilities between silicon and most of these complex oxides. A great amount of the research in this field has been done with samples grown by Molecular Beam Epitaxy (MBE), but the Pulsed Laser Deposition (PLD) technique offers several key advantages, and an easier scalability in industrial environments. In this work, we present a novel PLD-only procedure for the growth of ultra-thin and epitaxial $SrTiO_3$ (STO) pseudo-templates on Si (001) surfaces. The careful control and optimization of critical growth parameters allow us to obtain samples with optimal Sr/Ti ratios, ultra-thin (1-2 nm) interfaces, and outstanding surface crystallinity. The validity of these pseudo-templates is also demonstrated by the overgrowth of STO thicker samples, which present interfaces and properties comparable to those of the pseudo-templates.

## 1. Introduction

The properties of Strontium Titanate ($SrTiO_3$, from now on STO), like its high dielectric constant[1], chemical stability and so on, have gathered the

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