

**Crystalline Oxides on Si: Compliant Substrates for
III-Vs Compound Semiconductors**

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Abstract:

An all-epitaxial concept of compliant substrate for the compound semiconductor growth on Si is introduced. It relies on the use of single crystal oxides on Si as the epitaxial buffer for the subsequent growth of compound semiconductors. More specifically, single crystal cubic Perovskite oxides such as SrTiO₃ (STO) grown on Si (100) have been used. The thin STO (<50Å) layer in conjunction with a thin SiO_x amorphous (20Å) layer at the STO/Si interface acts as an elastic membrane mechanically decoupled from the Si substrate that is only 2.3% mismatched to GaAs. When the STO layer is thin enough the strain is reduced even further down to 1.18% for a 40Å STO due to strain sharing and flip between the GaAs layer and the STO layer. The final mismatch between the GaAs layer and the STO membrane is much lower than the mismatch between GaAs and Si (4%).

We will report on the preparation of the GaAs/STO/SiO_x/Si stack, the structural, electrical and optical properties of the GaAs layer.

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