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Epitaxial growth of BiFeO₃ thin films on SrTiO₃/Si substrates¹

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State University — We are using molecular beam epitaxy (MBE) to grow BiFeO₃
(BFO) thin films. SrTiO₃ (STO) on Si is used as a virtual substrate to enable the
growth of BFO. Commensurate growth of STO on Si using MBE has been achieved
by using co-deposition with the fluxes adjusted for stoichiometric growth and the
growth rate is determined using RHEED intensity oscillations. The native oxide of
the Si substrates is removed in-situ by deoxidation at around 750 ° C using a flux of
Sr. The substrate is cooled to 500 ° C and additional Sr is added to form template
with a (2x1) surface structure. BFO is then deposited on well-characterized STO
(2-20nm thick) on Si using Fe and oxygen plasma with an overpressure of Bi flux-
the growth rate being controlled by the incoming Fe flux. The RHEED pattern
taken during deposition of BFO shows 2-D growth front with a 6-fold surface re-
construction. The structural and magnetic properties of the BFO samples have also
been measured.

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