EUROPEAN SYNCHROTRON RADIATION FACILITY
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ESRF

ESRF	**Experiment title:** Short range ordering in InGaAsSbN dilute quantum wells probed by Sb-edges XAFS	**Experiment number**: **HS-2956**
Beamline: ID26	**Date of experiment**: from: 02 November 2005 to: 08 November 2005	**Date of report**: 25/02/08
Shifts: 18	**Local contact(s)**: Dr. Pieter GLATZEL	*Received at ESRF:*

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Report:

Part of the results of the present work has been published in **Physical Review B**.

Full reference details:
G. Ciatto, J. C. Harmand, F. Glas, L. Largeau, M. Le Du, F. Boscherini, M. Malvestuto, L. Floreano, P. Glatzel, and R. A. Mori, "Anions relative location in the group-V sublattice of GaAsSbN/GaAs epilayers: XAFS measurements and simulations", ***Physical Review B* 75***, 245212* (2007).

Abstract:
We investigated the local structure around N and Sb atoms in GaAsSbN/GaAs epilayers as a function of growth conditions and annealing time via soft and hard X-ray absorption spectroscopy in order to find out if short range ordering (SRO) in the group-V sublattice is present. SRO is one of the potential origins of the huge blue-shift of the band gap observed upon annealing in these materials. By combining a Sb K-, L-, and N K-edge XAFS analysis we demonstrate that neither strong Sb clustering nor preferential Sb-N association are possible, and that Sb atoms see a *random* number of N next nearest neighbors except for

growth temperatures smaller than 400 °C, for which Sb-N neighbors in the type-V sublattice are in excess with respect to statistical disorder. On the other hand, the evolution of SRO around N anions (breaking of nitrogen pairs and randomization) can play a role in the annealing-induced band gap blue shift. Varying growth conditions and concentration modifies the band gap but, surprisingly, it does not affect the position of the conduction band minimum when Sb is incorporated.