

HL 82: Invited Talk Dan Buca

Time: Thursday 15:00–15:30

Location: EW 202

Invited Talk

HL 82.1 Thu 15:00 EW 202

Group IV GeSn alloys - a viable solution for Si-based light emitters — •DAN BUCA, STEPHAN WIRTHS, SIEGFRIED MANTL, and DETLEV GRÜTZMACHER — Peter Grünberg Institut 9, Forschungszentrum Jülich, Jülich, Germany

Silicon photonics is the key to overcome current limits in bandwidth and energy consumption associated with metal interconnects of complementary metal-oxide-semiconductor (CMOS) chips. Despite of the progress in the development of optical components such as Si compatible waveguides, modulators or detectors, an integrated light source is still missing. Ge has gained a lot of attention as material for on-chip lasing due to its CMOS compatibility and its electronic band structure, where the indirect L-valley lies only approx. 140 meV below the direct

Gamma-valley. Hence, several approaches are presently pursued to improve the emission efficiency such as high n-type doping, the application of tensile strain, or alloying Ge with Sn. Both latter approaches lower the Gamma-valley faster than the indirect valleys facilitating a transition to a direct band gap material. GeSn alloys offer a global gain material in contrast to strained structures that are commonly defined locally. Here, we present the synthesis of strain-relaxed GeSn layers with Sn-contents up to 14%. The analysis of temperature-dependent photoluminescence (PL) measurements provided direct evidence for the transition from indirect to fundamental direct bandgap GeSn alloys. Recently, we could confirm optical gain by optical pumping of waveguide structures fabricated on a thick Ge_{0.87}Sn_{0.13} layer. Finally unambiguous lasing action is presented.