III-V-on-silicon microdisks for on- and off-chip all-optical communication

Due to the extensive research being done in the optical technology it is set to revolutionize the short-reach as well as long reach communication. Silicon photonics is on the forefront to lead the optical technology for on-chip signal processing due to the availability of the mature and cost effective CMOS technology. For the realization of the multi- and fully-functional all-optical chips we need to realize and integrate the active photonic components and devices on a single chip. This is where the question arises if it is ever possible to realize the fully-functional optical chips with the use of only silicon material. The integration of III-V material on top of SOI waveguide circuits has the promise of realization of multi- and fully-functional optical chips. The talk will focus on different all-optical functionalities such as flip-flops, optical gates, wavelength convertors and de-multiplexers realized with III-V-on-silicon technology. These functionalities are based on the microdisk lasers and resonators. Some functionalities such as direct modulation of microdisk lasers and NRZ-OOK to RZ-OOK format conversion using the microdisk resonator will also be discussed which are promising for off-chip communication.

About the speaker:

Mr. Rajesh Kumar received M.Tech (Master of Technology) degree in Optoelectronics and Optical communication from Indian Institute of Technology Delhi, New Delhi (India), in 2008. For a short period of time he carried out research work in thin films and photonic crystal waveguides. Currently he is working as a Research Scholar in the Department of Information Technology, Interuniversity Microelectronics Center (IMEC) - Ghent University (Belgium). His current research interests include microdisk-based photonic components and devices for optical communication. Mr. Kumar has been active within the EU FP7 HISTORIC (Heterogeneous InP on Silicon Technology for Optical Routing and LogIC) project for more than three years. He is Student Member of OSA, SPIE and IEEE Photonics Society.