High-Q chalcogenide device platform without direct etching process for non-linear and mid-IR Applications

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There have been large efforts made to implement non-linear on-chip devices using chalcogenide glasses to exploit its high optical nonlinearities and transparency in infrared range. However, the operating powers of the devices are significantly high due to their low Q-factors (~10^5). The low Q-factors of the devices are originated from sidewall roughness occurred during etching process. In this talk, I will show our new device platform that defines chalcogenide devices without direct etching process. Using our platform, we have demonstrated chalcogenide resonators with record high (for on-chip chalcogenide devices) Q-factor (1.2 x 10^7) and Brillouin lasers with record low (for on-chip chalcogenide devices) threshold power (2.5mW). The device platform allows flexible control of dispersion which is a crucial element for non-linear photonic devices. The device platform also allows efficient and flexible coupling between resonators and waveguides. I will conclude the talk with comparing power efficiency of nonlinear devices of our device platform to that of several other on-chip platforms.

Biography:
Sangyoon Han is currently a postdoctoral fellow in the Physics department at KAIST, Korea. He received the B.S. degree in Electrical Engineering from the Seoul National University in 2010, and the Ph.D. degree in Electrical Engineering and Computer Sciences from the University of California, Berkeley in 2016. He was a recipient of a graduate bronze medal from Collegiate Inventors Competition 2015, and a recipient of Korea Foundation for Advanced Studies Scholarship. His research interests include silicon photonics, non-linear optics, MEMS, heterogeneous integration, and LIDAR. He has authored and coauthored 28 papers in leading technical journals and conferences.