Tutorial Speaker	
Full Name	Yong-Hee Lee
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Presentation Title	Very Small Lasers and Resonators

Biography

Prof. Lee pioneered the first proton implanted 850-nm GaAs quantum well Vertical Cavity Surface Emitting Lasers (VCSELs). The monolithic VCSEL opened a new era of micro-lasers, and are widely used today in the real world for applications such as data communications, laser mice, metrology, sensing and more.In 1991, he joined the Department of Physics at KAIST and produced over 40 PhD's in physics. His recent interest lies on photonic nano-structures and nano-photonic integrated circuits. His laboratory demonstrated various forms of small lasers.
Prof. Lee has published >200 articles on nanophotonics and VCSELs. The total citation is >12,000 with H-index of 56. In 2003, he was elected as an LEOS Distinguished Lecturer. In 2007 he was elected as an IEEEFellow, also as a Korea National Science Fellow, and in 2011 as an OSA Fellow. He served as an associate editor of Optics Express 2008~2011. In 2013 he received the Humboldt Research Award from Germany. He received the Engineering Achievement Award from IEEE Photonics Society in 2014. Domestically he received the National Academy of Sciences Award (Natural Science) in 2002 and the Science Prize (Physics) in 2010 from MOEST.

200 words abstract

In 1989, the vertical cavity surface emitting laser opened a new era of planar microlasers currently deployed for short reach data communications. In 1999, novel two-dimensional photonic crystal slab lasers were firstly demonstrated and various electrically- and optically-pumped two-dimensional photonic crystal lasers soon followed. Then after another decade or so, we witnessed 1-Dladder style nanobeam lasers and resonators. Plasmonic resonators/lasers that can be made even smaller also drew attentions of community in recent days. In this tutorial, room temperature cw 1-D nanobeam lasers with ultra-low lasing threshold of 230 nW (optical), which is the lowest among lasers at room temperature is discussed in detail. This was achieved by reducing the size of active medium down to 1.5×0.3×0.02 μm3 through selective wet-etching of quantum well layer, leaving the gain only inside the cavity region. We employed a relatively thick (420 nm) InP structure, with which mechanical stability and thermal dissipation can be significantly improved. With proper electrical contacts, the proposed structure is expected to be operable with ~100 nA electrical current. The potentials and limits of the very small metallic lasers and resonators will also be addressed.