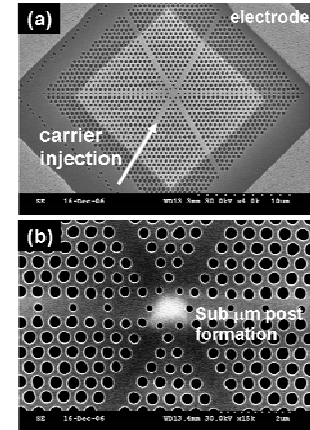


## Electrically driven photonic crystal single cell cavity structure for low threshold lasing action

Min-Kyo Seo, Kwang-Yong Jeong, Jin-Kyu Yang, and Yong-Hee Lee  
Department of Physics, Korea Advanced Institute of Science and Technology,  
Daejeon, 305-701, Korea

Recently, the electrically driven photonic crystal (PhC) single cell laser, with a sub-micrometer-size post at the center of the cavity, has been developed.[1] In the case of the PhC laser with QWs, the surface recombination (SR) of the injected carriers increases the laser threshold current.

The PhC single cell cavity coupled with PhC waveguides (WGs) can support the hexapole mode and suppress the other modes.[2] The WGs can be used for current channels into the cavity region in order to reduce SR. The hexapole mode has minimal degradation of its quality factor from introducing the central post structure, since its electric field distribution has a node at the center. We expect that this cavity would show very low threshold lasing about  $< 0.1\text{mA}$ .



(a) WG-PhC cavity  
(b) SEM image of the sub micrometer post

[1] Hong-Gyu Park, et. al., *Science*, **305**, 1444 (2004)

[2] Sun-Kyung Kim, et. al., *Applied Physics Letters*, **88**, 161119 (2006)