**Carbon nanostructures for broadband nonlinear photonics**

이 상 민 (F. Rotermund)

*Department of Physics, KAIST, Daejeon 34141, Korea*

Carbon nanostuctures such as carbon nanotubes (CNTs) and graphene have been widely investigated for a variety of applications. In addition to diverse applications for electronic and optoelectronic devices, CNTs and graphene have been successfully used as ultrafast nonlinear switching devices in Q-switched and mode-locked lasers in wide spectral ranges. Compared to CNTs where the operation wavelength mainly depends on the diameter and chirality of nanotubes defining the bandgap, graphene exhibits the great advantage of ultrafast nonlinear saturable absorption over ultrabroad spectral region without bandgap engineering due to its unique point-bandgap structure. Furthermore, graphene possesses interesting nonlinear optical characteristics in the THz region. Nonlinear characteristics can be controlled by random stacking of graphene, and hence, substantially enhanced nonlinearity can be observed with increasing number of graphene layers. It is also possible to fabricate different hybrid structures based on graphene, exhibiting enhanced nonlinearities. In this talk, recent progress in carbon-nanostructure-integrated compact Q-switched and mode-locked lasers and also interesting results on THz nonlinear photonics based on graphene and graphene-based structures will be presented.