# Visible region photo-sensors based on $CdS_xSe_{1-x}$ nanobelts

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Recently, one-dimensional semiconductor nanostructures including nanowires, nanotubes, and nanobelts have attracted considerable interest for their potential as the building blocks for fabricating various nanodevices. However, In spite of potential advantages of nanowire-based opto-electronic devices, they have considerable fabrication issues such as alignment, assembly, or making electrical contacts. Thus, nanowire-based devices are usually fabricated by expensive and time consuming processing steps such as electron-beam lithography to define the electrical contacts. Due to these complicated fabrication processes, their commercialization and mass production is still in question.

In this talk, we report on a novel fabrication of $CdS_xSe_{1-x}$ $(0 \leq x \leq 1)$ nanobelts-based photo sensors without any arduous lithography process. X-ray diffraction and transmission electron microscopy analyses revealed that the $CdS_xSe_{1-x}$ nanostructures were single crystalline in wurtzite structure and complete solid solution of CdS-CdSe without any phase separation. In photoluminescence measurements, we found that the direct bandgap energy of the nanostructures changes linearly with the composition. These results suggest that the bandgap energy of the $CdS_xSe_{1-x}$ nanostructures can be systematically modulated in the spectral range from 1.74 to 2.45 eV. For fabricating optical sensors, we dispersed the $CdS_xSe_{1-x}$ nanobelts on the inter-digitized electrodes, which were prepared by a conventional photolithographic process and Cr/Au metallization on the glass substrate. It was observed that the cut-off frequency of the optical sensor shifted toward longer wavelength region with the increase in the surphur composition.

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