

The Facile way for converting chalcogen in transition metal dichalcogenides

Seok Joon Yun^{1,2} and Young Hee Lee^{1,2*}

¹*Center for Integrated Nanostructure Physics (CINAP), Institute for Basic Science (IBS), Sungkyunkwan University, Suwon 446-746, Korea*

²*Department of Energy Science, Sungkyunkwan University, Suwon 446-746, Korea*
leeyoung@skku.edu

Abstract

The in transition metal dichalcogenides alloys(TMD) has been attract a lot of attention because of modulating its electronic structure. Several methods including chemical vapor transport (CVT) and chemical vapor deposition (CVD) process have been reported to obtain the TMD alloy. CVD is regarded as one of the easy way to get monolayer TMD alloys. There are mainly two approaches for growing TMD alloys. One approach is introducing two type of chalcogens during growth process [1]. Another approach is converting chalcogen via annealing pre-grown TMD in different chalcogen atmosphere.

Herein, we report facile way for converting chalcogen in monolayer TMD by introducing conversion promoter. Not only the conversion rate was dramatically enhanced but also the annealing temperature was reduced. To confirm conversion rate and mechanism, Raman, AFM, XPS and TEM measurements were conducted. We successfully converted MS_2 to MoX_2 (M : Mo,W, X : S, Se) and fabricated hetero-junction.

References

- [1] Gong et al, Nano lett., **14** (2014) 442-449.
- [2] Su et al, small., **10** (2014) 2589-2564.