

Nanostructure Synthesis and Fabrication

Room On Demand - Session NS4

ALD on 2D Related Materials and Devices

NS4-1 Recovery Enhancement of Al₂O₃ Functionalized MoS₂ Gas sensor by Atomic Layer Deposition, *Inkyu Sohn, S. Wi, Y. Kim, M. Kim, H. Yoon, S. Jung, H. Kim*, Yonsei University, Korea

Two-dimensional (2D) transition metal dichalcogenides (TMDs) which possess large surface-to-volume ratio have been widely used for room temperature gas sensing applications. [1] However, due to its intrinsic defect or vacancies on TMD surface, incomplete recovery of TMD gas sensors hinder the realization of reliable and repeatable use of 2D TMD gas sensors. [2] Here, we demonstrate improvement of recovery rate of TMD gas sensors by covering TMD surfaces' defect or vacancies with Al₂O₃ using atomic layer deposition. Raman, AFM, XPS data have been showed. Especially, SEM data have showed that Al₂O₃ is partially covered on grain boundaries or defects of MoS₂ which is favorable for enhancing recovery performance of TMD gas sensors. The pristine MoS₂ gas sensors show 74 % of recovery rate in the case of NO₂ sensing. However, the recovery rate of the Al₂O₃ functionalized MoS₂ gas sensors improved up to 96 %. Our proposed method shows promising strategy for improving recovery rate of 2D TMD gas sensors.

References

- [1] Late, D. J. *et al.* Sensing behavior of atomically thin-layered MoS₂ transistors. *ACS Nano***7**, 4879–4891 (2013).
- [2] Lee, K., Gatensby, R., McEvoy, N., Hallam, T. & Duesberg, G. S. High-performance sensors based on molybdenum disulfide thin films. *Adv. Mater.***25**, 6699–6702 (2013).

Author Index

Bold page numbers indicate presenter

— J —
Jung, S.: NS4-1, **1**
— K —
Kim, H.: NS4-1, **1**

Kim, M.: NS4-1, **1**
Kim, Y.: NS4-1, **1**
— S —
Sohn, I.: NS4-1, **1**

— W —
Wi, S.: NS4-1, **1**
— Y —
Yoon, H.: NS4-1, **1**