
7th International Workshop on 2D Materials

Title of the Presentation: Growth dynamics of 2D materials

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Short Biography:

Dr. Toshiaki Kato has completed his Ph.D from Tohoku University, Japan, in 2007. He was a visiting researcher at Stanford University from 2008 to 2009. He joined the faculty of the Tohoku University in 2007 and he is currently an associate professor of Electrical Engineering. His research interests have ranged from structural-controlled synthesis to optoelectrical device application of layered nano materials such as carbon nanotubes, graphene, graphene nanoribbon, and transition metal dichalcogenides.

Abstract:

2D materials include excellent electrical and optical properties, which can be useful as various future optoelectrical applications. Recent progress in the production stage of 2D materials enable us to fabricate optoelectrical devices such as thin film transistors [1,2], non-volatile memories [3], and transparent solar cells [4]. However, there are huge gap between the current device performance and theoretically predicted one. One of the critical issues is the relatively low quality of CVD grown 2D materials. To improve the material quality, understanding the growth mechanism is important. Unfortunately, the detailed growth dynamics of 2D material is still uncovered yet. Recently we have developed new CVD system, which can directly monitor the growth of TMD as real time optical images [5]. By using this in-situ monitoring CVD, we elucidate the unique growth dynamics of monolayer tungsten disulfide (WS_2) from thermodynamical point of view. In this lecture, I'll discuss the latest results relating with this topic together with the review of previous achievement about the growth mechanism of 2D materials.

[1] T. Kato and R. Hatakeyama, *Nat. Nanotechnol.* **7**, 651 (2012).

[2] H. Suzuki, T. Kaneko, Y. Shibuta, M. Ohno, Y. Maekawa, and T. Kato, *Nat. Commun.* **7**, 11797 (2016).

[3] H. Suzuki, N. Ogura, T. Kaneko, T. Kato, *Sci. Rep.* **8**, 11819 (2018).

[4] T. Akama, W. Okita, R. Nagai, C. Li, T. Kaneko, T. Kato, *Sci. Rep.* **7**, 11967 (2017).

[5] C. Li, T. Kameyama, T. Takahashi, T. Kaneko, T. Kato, *Sci. Rep.* **9**, 12958 (2019).