

マテリアルサイエンス系セミナー(第11回)

テーマ Two-dimensional materials with novel functionality for photon-to-energy conversions

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場所: マテリアルサイエンス系研究棟4棟8階 中セミナー室

講演要旨:

In this talk, I would like to present several novel energy conversion systems based on 2D materials. In the first part, I would like to address the energy conversion systems based on graphene and other 2D atomic layer materials. Strong light-matter interaction at the graphene-heterostructures results in novel functionality in photovoltaic and photochemical conversions. Here, we demonstrate the examples of “crack-filled graphene (CFG) films” [1] and “sunlight-activated” transparent electrodes”[2,3,4] for high-performance solar cell applications. I would like to address the new application of using 2D atomic oxides as efficient electron or hole transporting layers in polymer solar cells and organic-inorganic perovskite solar cells developed in our lab.[5,6]

In the second part, I would like to also present our recent result of the investigation on the photochemical cell application of 2D atomic layer materials. In particular, the photocatalytic activity of individual single atomic flakes of various 2D atomic materials will be addressed, where a single atomic layer photochemistry provides an ideal platform for exploring the fundamental mechanism of charge transfer on 2D materials or 2D heterostructures.

Finally, I would like to address some results related to organic-inorganic hybrid perovskite solar cells [7,8] and the new discovery in the emerging field of 2D layered perovskites in our group.

Reference:

- [1]. *Advanced Materials* Vol.27, 1724, (2015)
- [2]. *Advanced Materials*, Vol.27, 7809, (2015)
- [3]. *Advanced Materials*, Vol. 27, 282, (2015)
- [4]. *Energy & Environmental Science*, 8, 2085, (2015)
- [5]. *ACS Nano*, Vol. 4, 3169, (2010)
- [6]. *Advanced Energy Materials*, 1701722, (2017)
- [7]. *Energy & Environmental Science* 9, 1282-1289 (2016)
- [8]. *Nano Letters*, 17, 1154, (2017)

講演者略歴:

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参加申込・予約は不要です。直接会場にお越しください。

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