



Graphitic Carbon Nitride Films and Their Use in Optoelectrical Devices

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Presentation Preference: Oral

Career Level: Early Career Scientist

Aligned with Science Focus: photo-catalysis

Abstract:

In this presentation, we would report the growth of graphitic carbon nitride (C_3N_4) thin films and their performance in organic solar cells, LEDs and photoelectrochemical cells. C_3N_4 is a metal-free semiconductor with ideal bandgap of 2.7 eV. It is extensively studied in photocatalytic reactions, such as hydrogen/oxygen evolution from water splitting, CO_2 reduction as well as organic reactions^{1,2}. However, it has been a great challenge to prepare C_3N_4 thin films using conventional deposition methods due to the fact that C_3N_4 usually exist in the form of big aggregates and that C_3N_4 is not soluble in almost all the solvents. Here, we developed a general, liquid-mediated pathway for the growth of continuous C_3N_4 thin films on various substrates such as FTO, metal foil and TiO_2 membrane.³ The deposition method consists of the use of supramolecular complexes which transform to liquid state before direct thermal condensation to C_3N_4 solid films. The easy, safe and direct synthesis of carbon nitride in a continuous layered architecture on different functional substrates opens new possibilities for the fabrication of many energy-related devices.

Reference

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- (2) Zheng, Y.; Lin, L.; Wang, B.; Wang, X. *Angew.Chem. Inter. Ed.* **2015**, *54*, 12868.
- (3) Xu, J.; Brenner, T. J. K.; Chabanne, L.; Neher, D.; Antonietti, M.; Shalom, M. *J. Am. Chem. Soc.* **2014**, *136*, 13486.

Biographical Statement of speaker:

Jingsan Xu obtained his PhD from Shanghai Institute of Ceramics and has studied and worked at UC Berkeley and Max Planck Institute. Dr Xu is an ARC DECRA Fellow and is appointed as a Senior Lecturer at QUT. His research focuses on materials chemistry, photocatalysis and other energy-conversion processes.

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