基于有机脱卤策略制备碳材料

杜克文，张国新*

山东科技大学，铝电池研究中心，青岛市黄岛区前湾港路 579 号，266590

*Email: zhanggx@sdust.edu.cn

碳材料来源广泛、成本经济、物理化学性质高度可调、应用广泛。然而，碳材料主要经由热处理有机碳源的方法获得，产生了多重问题，如：（1）需提供高能输入促进碳化；（2）产生大量有毒有害气体。针对以上问题，我们设计了一种基于有机脱卤反应制备碳材料的策略，该策略可实现温和条件下碳材料的清洁、快速制备。如：卤化高分子在强碱的促进下，室温既可完成官能团的脱除及碳化，整个过程无废气产生。XPS 测试证实室温所得的碳材料含有>75%的碳。脱掉卤素的碳位具有非常高的反应活性，可实现快速的官能化及元素掺杂。进一步的探究表面，该有机脱卤策略可延伸至石墨烯材料的制备，使用强碱可在室温条件下，快速脱除氟化石墨的氟官能团，实现氧化石墨烯的制备。利用卤化官能团脱除过程中原位产生的副产物，可进一步对所合成的碳材料的多个方面进行调控，如：组分、形貌、孔结构、维度尺寸等，为其电化学性质的调变和优化提供有力手段。

关键词：碳材料；脱卤反应；可控制备；电化学应用

参考文献

[1] Guo M, Qiu C, Zhang G*, et al. *ChemElectroChem*, **2017**, **5(2)**: 242.
[2] Zhang C, Zhang G*, Li H, et al. *Electrochim. Acta*, **2017**, **247**: 1044.
[3] Hu C, Zhang G*, Li H, et al. *RSC Adv.*, **2017**, **7(36)**: 22071
[4] Zhang G, Wang J, Sun X*, et al. *Carbon*, **2017**, **115**:28-33.
[5] Zhang G, Wang L, Sun X*, et al. *Adv. Funct. Mater.*, **2016**, **26(19)**: 3340.
[6] Zhang G, Luo H, Sun X*, et al. *Nano Energy*, **2016**, **26**: 241.
[7] Zhang G, Zhou K, Sun X*, et al. *Carbon*, **2016**, **96**: 1022.
[8] Zhang G, Jin X, Sun X* et al. *Sci. China. Mater.*, **2016**, **59(5)**: 337

Fabricating carbon materials via polymer dehalogenation

Kewen Du, Guoxin Zhang*
Al-ion Battery Research Center, Shandong University of Science and Technology, Qian-wan-gang Road, No.579, Huangdao district, Tsingtao, 266590.

Carbon materials have been widely recognized as key materials for many applications due to their merits of abundant resources, low costs, and rich flexibilities on the optimization of composition, structure, porosity, etc, Their synthesis mainly go through the defunctionalization of organic matters, which require large amount of energy input and also large quantity of hazardous gases exhausted. To meet these ends, we proposed a facile route based on the dehalogenation of halogenated polymers (such as PVDF, PVDC, and PVC) by strong alkaline (such as KOH) to fabricate carbon materials under mild conditions, no gaseous byproducts were formed. Similarly, the dehalogenation strategy can be extended to the facile synthesis of heteroatom doped carbon materials and graphene oxide. It is also feasible to tune many other criterions of carbon materials (such as morphology, structure, porosity, etc) for optimizing their electrochemical applications.