Inverse Pickering emulsions stabilized by carbon quantum dots: influencing factors and their application as templates

Xiangang Zhai, Jianping Gao, Xiaoxue Wang, Shunkang Mei, Ruiru Zhao, Yongli Wu, Chaoyue Hao, Jiangbing Yang, Yu Liu

PII: S1385-8947(18)30433-9
DOI: https://doi.org/10.1016/j.cej.2018.03.075
Reference: CEJ 18682

To appear in: *Chemical Engineering Journal*

Received Date: 15 December 2017
Revised Date: 10 March 2018
Accepted Date: 14 March 2018

Please cite this article as: X. Zhai, J. Gao, X. Wang, S. Mei, R. Zhao, Y. Wu, C. Hao, J. Yang, Y. Liu, Inverse Pickering emulsions stabilized by carbon quantum dots: influencing factors and their application as templates, *Chemical Engineering Journal* (2018), doi: https://doi.org/10.1016/j.cej.2018.03.075

Inverse Pickering emulsions stabilized by carbon quantum dots: influencing factors and their application as templates

Xiangang Zhai[a], Jianping Gao[a,*], Xiaoxue Wang[a], Shunkang Mei[a], Ruiru Zhao[a], Yongli Wu[a], Chaoyue Hao[a], Jiangbing Yang[a], Yu Liu[a,*]

[a]Department of Chemistry, School of Science, Tianjin University, Tianjin 300072, PR China

Abstract

Carbon quantum dots (CQDs), have received a great deal of attention owing to their outstanding physicochemical characteristics and versatile applications. CQDs were employed to stabilize water/oil inverse Pickering emulsions and diethyl-o-phthalate (DEP) was the most suitable oil phase solvent. The stability and average droplet size of the CQD-stabilized inverse Pickering emulsions depended on several factors including sonication time, CQDs concentration, the DEP/water ratio and pH. Additionally, adding an electrolyte to the CQDs aqueous solution greatly enhanced the stability of the inverse Pickering emulsions and decreased the emulsion droplet size. In fact, the addition of Mg^{2+} significantly improved the stability of the emulsions so that they were stable for more than 4 months. Furthermore, the best conditions for obtaining optimal emulsion were confirmed. In addition, Ag/CQDs microspheres with average size of less than 1 μm were achieved using inverse Pickering emulsions as templates. These microspheres exhibited excellent catalytic performance for the reduction of 4-nitrophenol in the presence of $NaBH_4$. This scheme of confining reactants to tiny pools of water is a facile and green synthetic strategy which has the potential to open new avenues for the design and fabrication of