Parameter optimization on the compressed polypyrrole/carbon nanotube composite electrode for capacitive deionization

Dongya Ma\textsuperscript{a,b,c}, Yue Wang\textsuperscript{a,b,c,*}, Liwen Zhang\textsuperscript{a,b,c}, Zhiqiang Wang\textsuperscript{a,b,c}, Shichang Xu\textsuperscript{a,b,c}

\textsuperscript{a}Chemical Engineering Research Center, School of Chemical Engineering and Technology, Tianjin University, Tianjin 300072, China, Tel. +86 22 85356553; emails: tdwy75@tju.edu.cn (Y. Wang), mdy@tju.edu.cn (D. Ma), 809198898@qq.com (L. Zhang), zhiqiangw@tju.edu.cn (Z. Wang), xushichang@sina.com (S. Xu)
\textsuperscript{b}Tianjin Key Laboratory of Membrane Science and Desalination Technology, Tianjin 300072, China
\textsuperscript{c}Collaborative Innovation Center of Chemical Science and Engineering (Tianjin), Tianjin 300072, China

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\textbf{ABSTRACT}

For the capacitive deionization technology, it is vitally important to explore a proper electrode moulding technology to sufficiently perform the electrode performance. In this work, a compression moulding method was adopted for the fabrication of the novel polypyrrole/carbon nanotube (PPy/CNT) composite electrode and a typical optimization on the major preparation parameters was conducted, including the mass ratio of electrode material mixture, the electrode thickness and the moulding pressure. In the optimization process, the flexural strength tests were first introduced to optimize the moulding pressure. The results indicated that the performance of the PPy/CNT electrode fabricated by the compression moulding method got optimum at the moulding pressure of 10 Mpa, the mass ratio of 9:1:2 (PPy/CNT : polyvinylidene fluoride (PVDF) : graphite powder) and the thickness of 0.6 mm. Under the optimal conditions, the specific area capacitance and the area surface adsorption capacity of the PPy/CNT electrode were significantly improved and could reach up to 5.30 F/cm\textsuperscript{2} and 1.97 mg/cm\textsuperscript{2}, respectively.

\textbf{Keywords:} Capacitive deionization; Polypyrrole; Carbon nanotubes; Compression moulding method

\* Corresponding author.