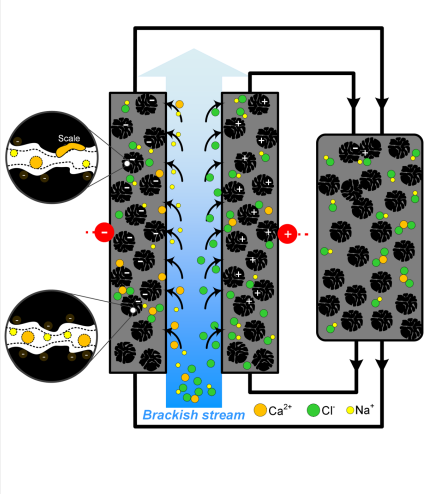
Flow-electrode capacitive deionization for resource recovery

UNSW Water Research Centre, School of Civil and Environmental Engineering

Flow-electrode capacitive deionization (FCDI)

Similar to capacitive deionization, FCDI is based on the formation of electrical double layers (EDLs) in charged suspensions of electrodes enabling capacitive energy storage with the minority charged constituents immobilized and selectively extracted from the saline water.



Competitive advantage

- Low-cost, viable alternative for resource recovery (e.g., ammonia, phosphorous and lithium) from waste streams;
- The use of flowable materials allows for the easy management of the electrode and continuous operation of the system.

Recent research projects

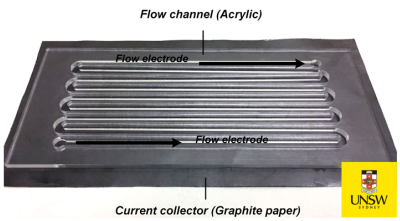
- Flow-electrode CDI and its applications for brine desalination;
- Optimisation of the flow-electrode and stacking of FCDI cells;
- Nutrient recovery from sewages by integrated flow-electrode/membrane systems;
- Noble metal recovery from brines and industrial wastewaters by flow-electrode CDI.

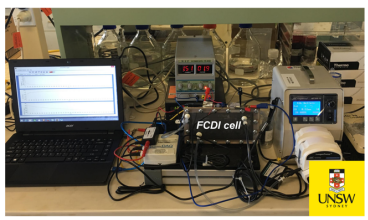
Successful applications

- Capacitive membrane stripping for ammonia recovery from wastewaters (CapAmm, Provisional Patent Application No. AU2017904868);
- Flow-electrode CDI for brackish groundwater desalination and softening.

Facilities and infrastructure

- UNSW Water Research Centre has extensive research resources and facilities including laser cutter, CNC mill, potentiostat electrochemical working station and stopped-flow instrumentation which ensures the implementation of high-quality research and development.





Composite current collector for FCDI and a bench-scale FCDI system

Our experts

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More information

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新南威尔士大学火炬创新园区
Torch Innovation Precinct at UNSW

流动电极电容去离子技术在资源回收中的应用

新南威尔士大学土木与环境工程学院水研究中心

技术核心竞争优势

- 低成本、可靠的从废水中回收资源回收（包括氨、磷、锂离子等）的技术；
- 流态材料的使用可以简化电极管理，并保证系统的连续运行。

近期项目

- 流动电极电容去离子系统以及它在卤水脱盐中的应用；
- 流动电极性能优化、FCDI 系统堆栈（以增加处理规模）；
- 利用流动电极/膜技术对污水中的营养盐进行回收；
- 利用流动电极电容去离子技术对盐水和工业废水中贵金属进行回收。

成功实施案例

- 利用电容膜气提法从废水中回收氨的成套技术方案（简称 CapAmm, 澳大利亚专利申请号: AU2017904868）；
- 利用流动电极电容去离子技术对地下苦咸水进行脱盐及水软化。

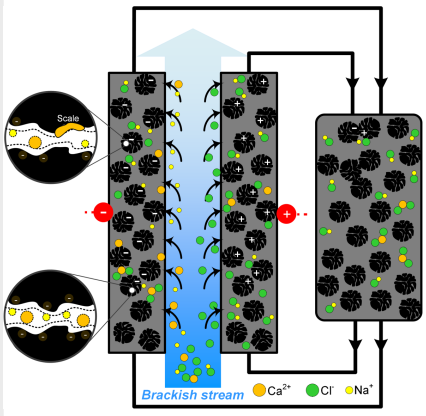
资源及设施

- 新南威尔士大学水研究中心拥有广泛的研究资源，为了保障高质量的研发工作开展，我们中心拥有包括激光切割机、数控车床、恒电位仪电化学工作站和中断流分析仪等众多仪器设备。

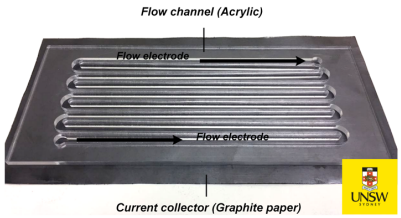
技术简介:

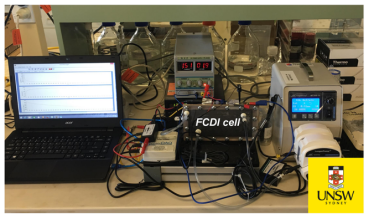
流动电极电容去离子技术

与传统电容去离子技术类似，流动电极电容去离子技术（即FCDI）通过在荷电流动电极表面形成双电层结构，从而将苦咸水中少数带电组分分离并以电容储能模式固定在电极表面。



低运行成本的流动电极电容去离子系统





符合材质的 FCDI 集流体（左图）以及实验室规模 FCDI 系统（右图）

专家团队

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