Monovalent Ion Selective Membranes for Desalination by mMCDI

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The increasing world-wide demand for clean water [1], the rising fresh water scarcity [2] and saltwater intrusion into fresh water resources are the driving forces to find innovative solutions for desalination and water purification. In many cases partial desalination e.g. removal of monovalent ions is sufficient and complete desalination as by reverse osmosis is not always needed. In addition fully desalinated water often has to be re-mineralized before its use. Membrane capacitive deionisation (MCDI) is a cost effective and suitable technology for this purpose [3]. However, the selective removal of monovalent ions is not possible with the current state of MCDI. The aim of the joint project innovatION is the development of monovalent ion selective membranes to be used in monovalent MCDI (mMCDI), allowing the selective removal of monovalent ions such as sodium, chlorine and nitrate from water sources exceeding the thresholds for drinking water.
Different approaches for the preparation of monovalent ion selective membranes like pore-filled membranes, membranes based on interpenetrating networks as well as modification of nanofiltration membranes are introduced. Basic properties such as conductivity, membrane resistance and permselectivity of these membranes will be presented and discussed in detail.
Furthermore, results from mMCDI experiments conducted on a 3-cell lab-scale mMCDI are presented.

References

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Acknowledgements
The authors like to thank the BMBF (grant no 02WV1572A and 02WV1572C) for financial support of this work.