

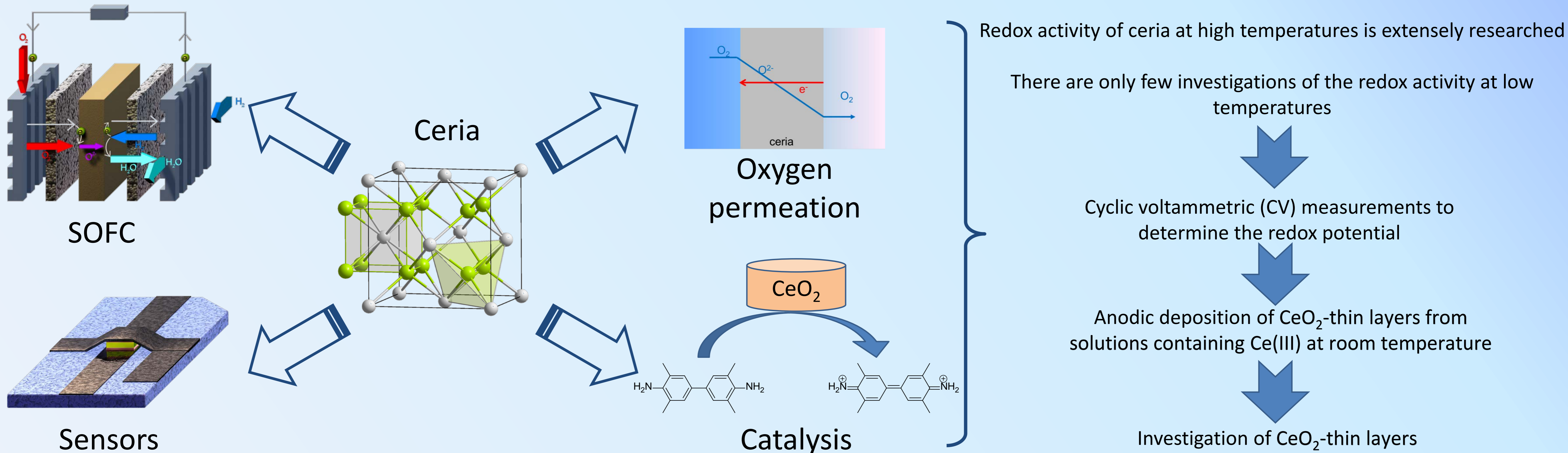


A. Buchheit, M. Grünebaum, M. M. Hiller, K. Schmale, H.-D. Wiemhöfer

e-mail: annika.buchheit@wwu.de, mariano.gruenebaum@wwu.de

Institute of Inorganic and Analytical Chemistry, Corrensstr. 28/30, 48149 Münster

Introduction [1-4]

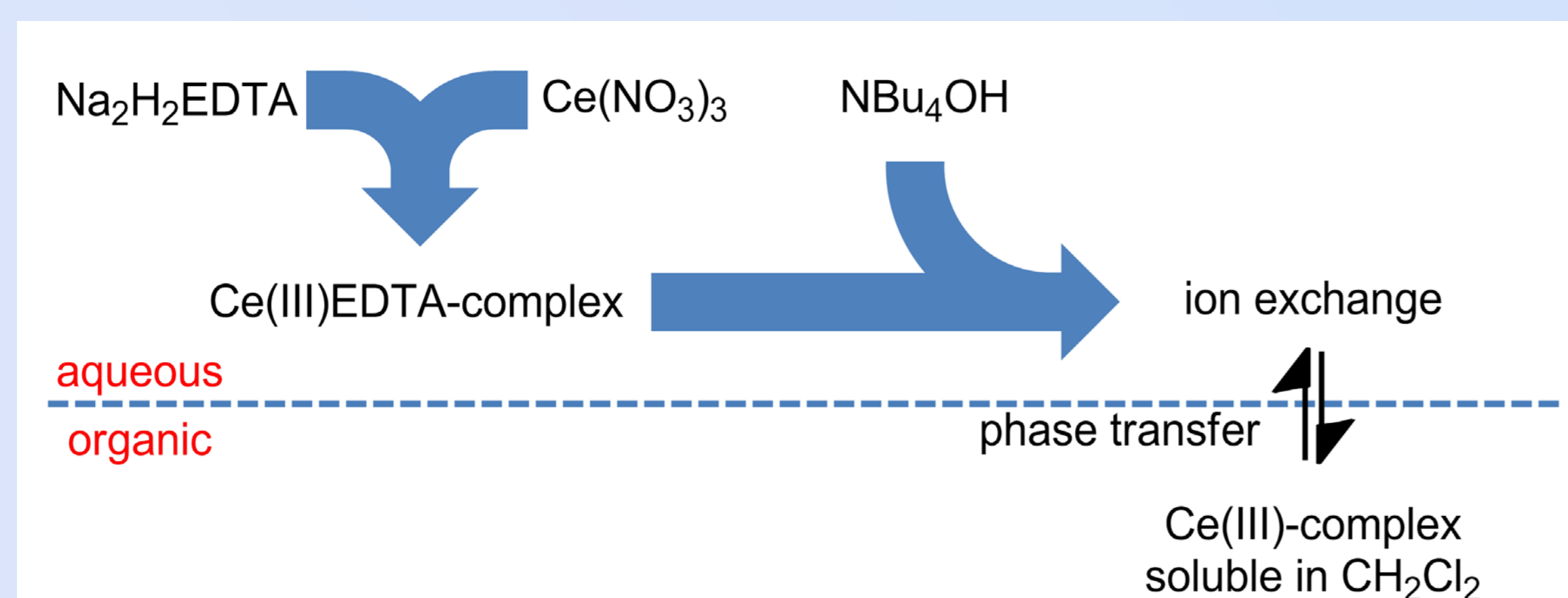


Experimentals

Composition of electrolyte solutions

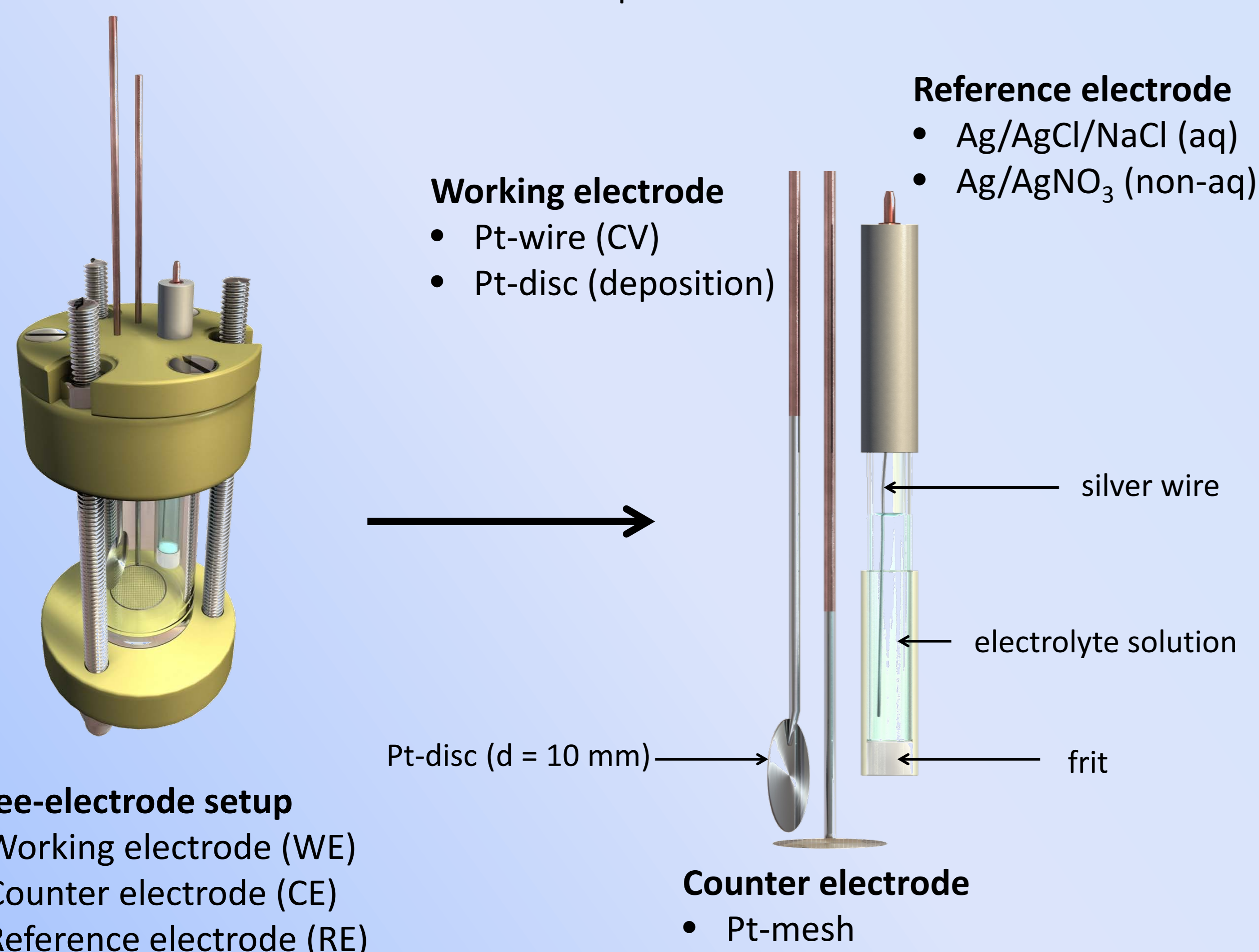
	solvent	Cerium(III) source	pH adjustant	Chelating agent
Aqueous [5]	Water	Cerium(III) nitrate hexahydrate	Sodium hydroxide	Disodium edetate
Non-aqueous	Propylene carbonate	Organic cerium(III) salt	Tetrabutylammonium hydroxide	--

Synthesis of organic cerium(III) salt



Measurement setup

Use of a measuring cell for liquid electrolytes for CV measurements and anodic depositions

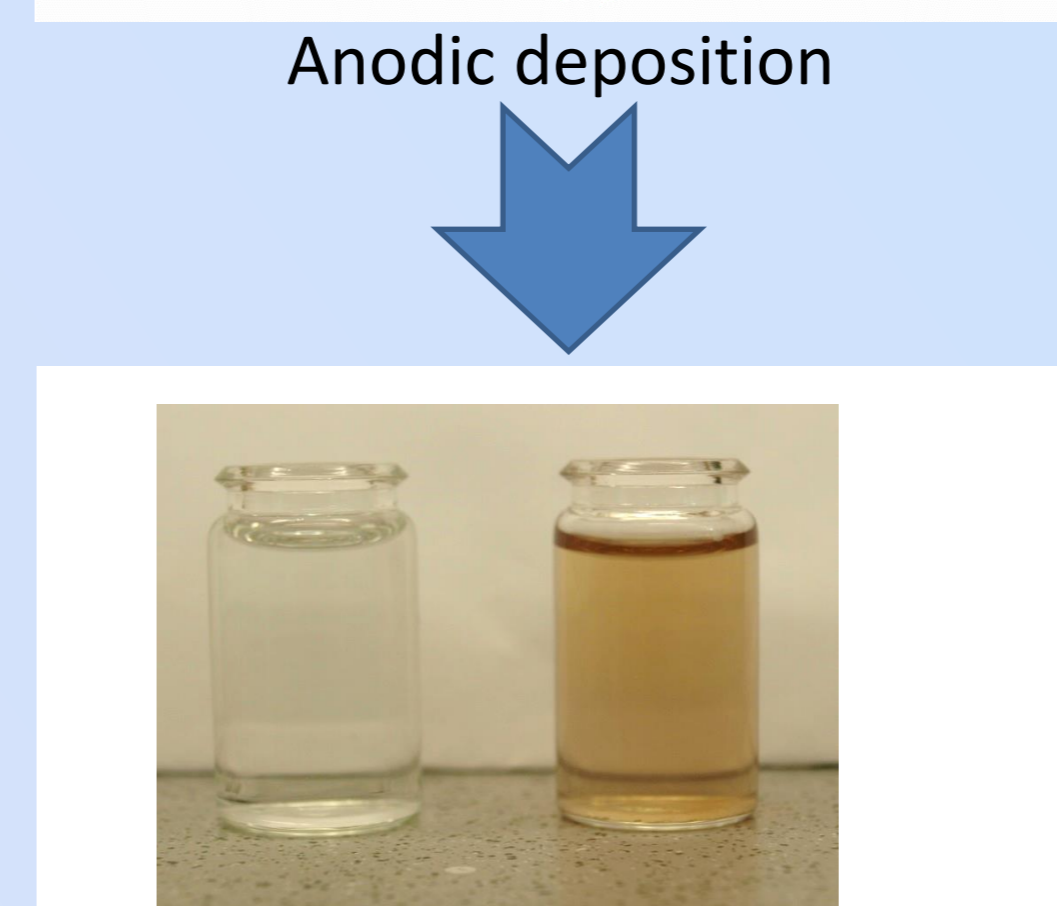
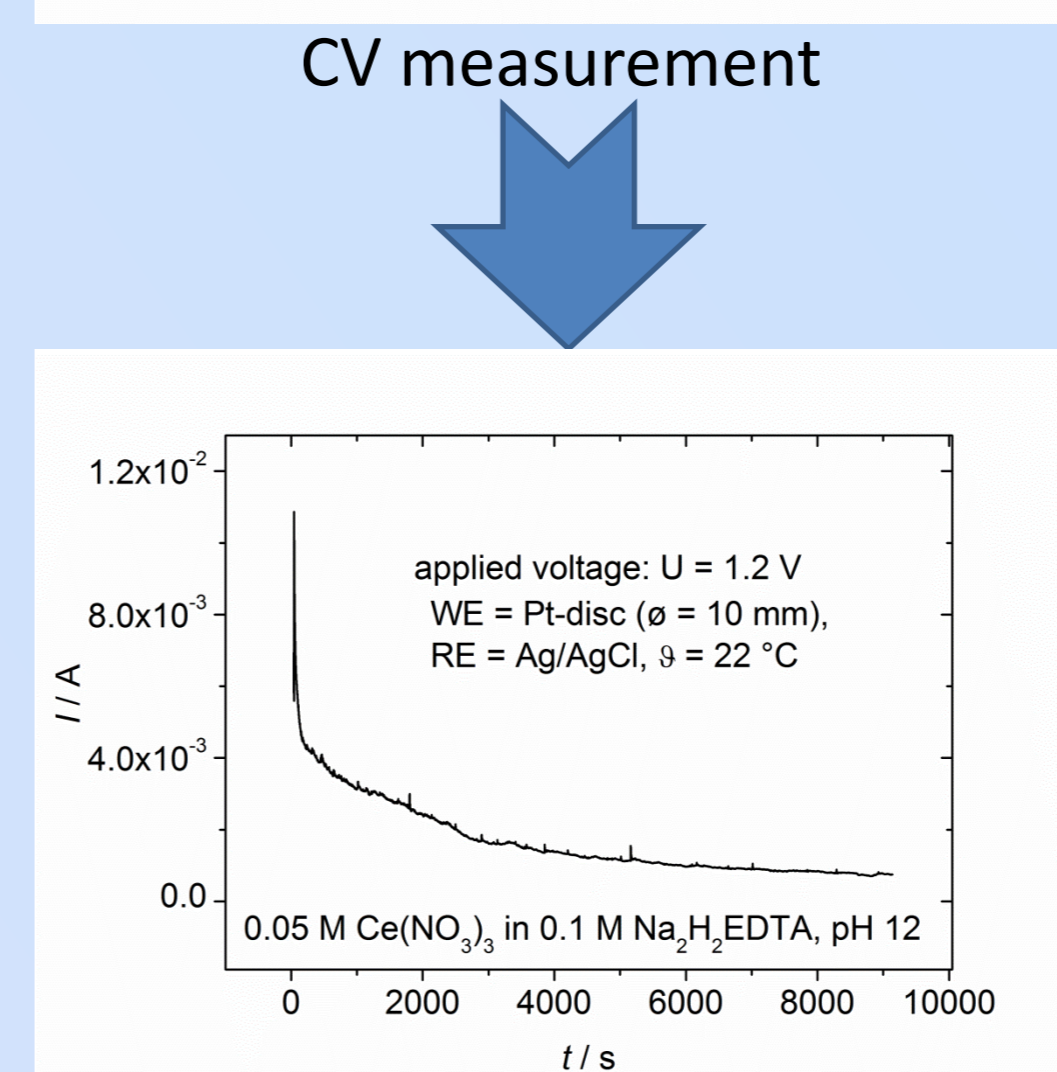
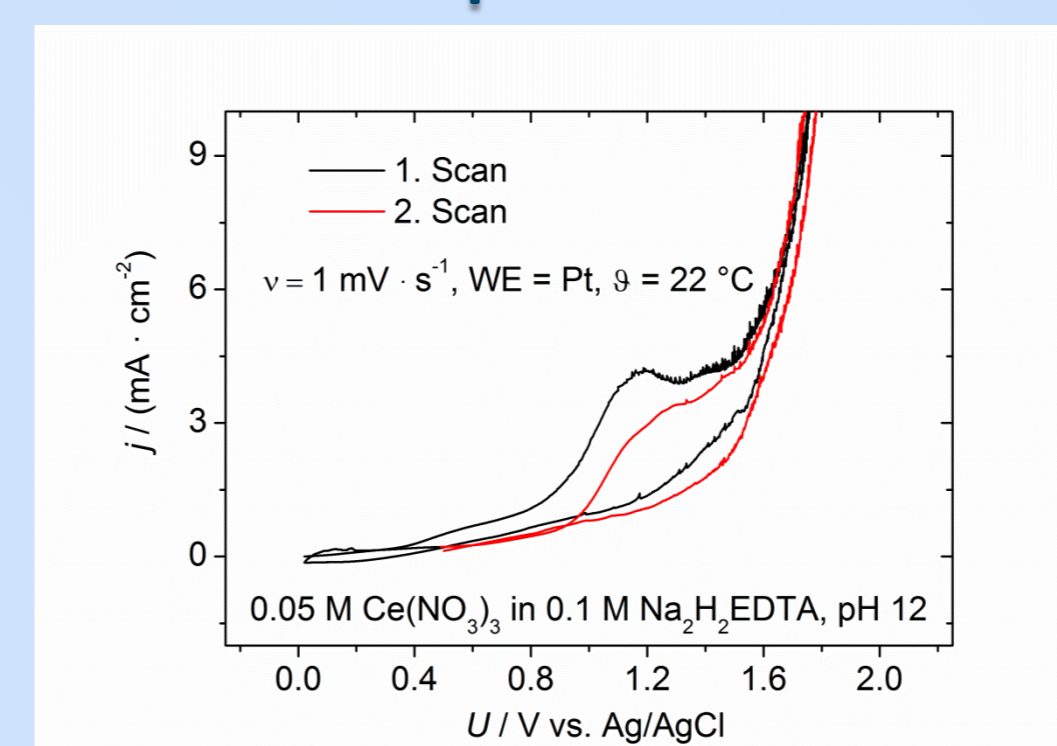


Three-electrode setup

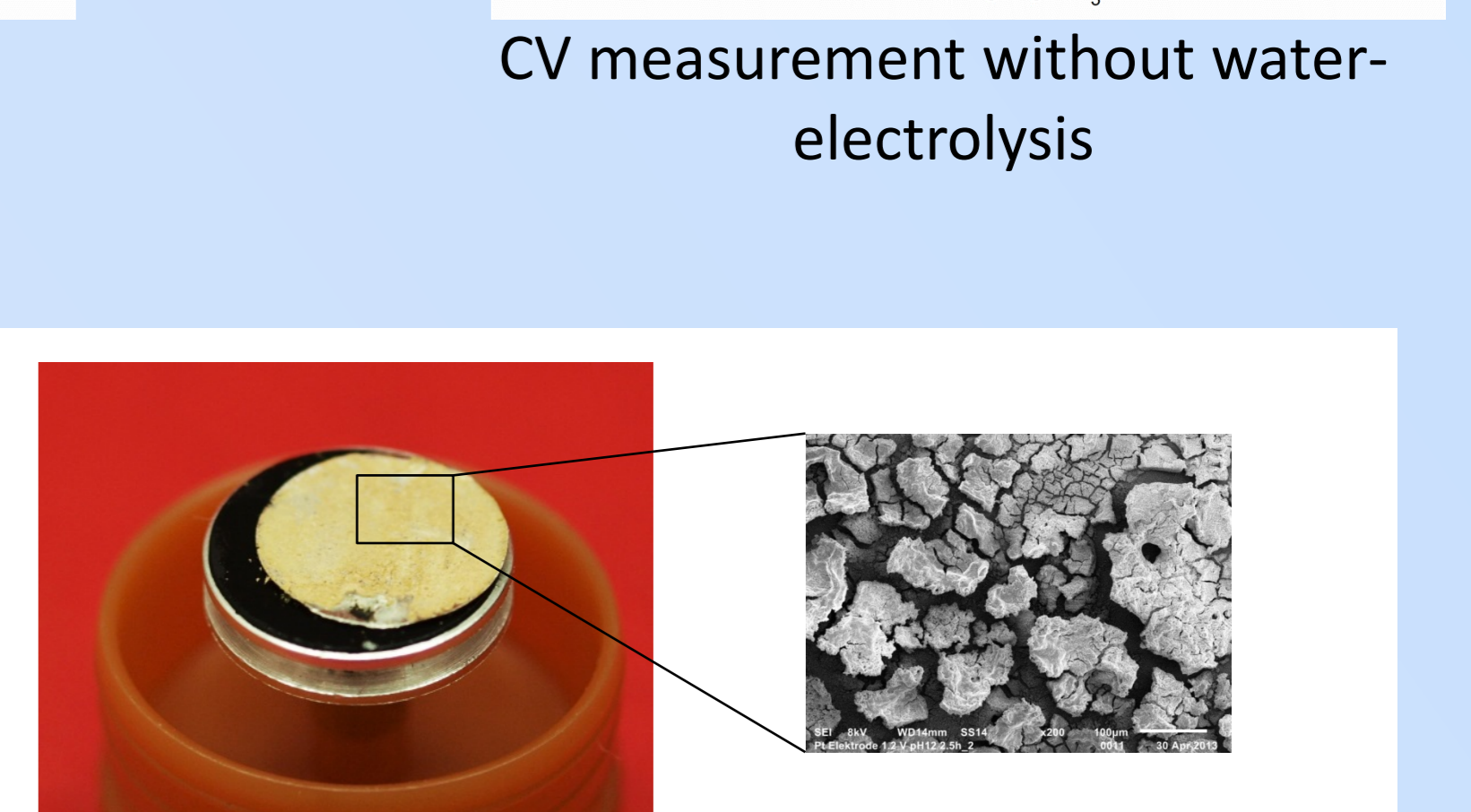
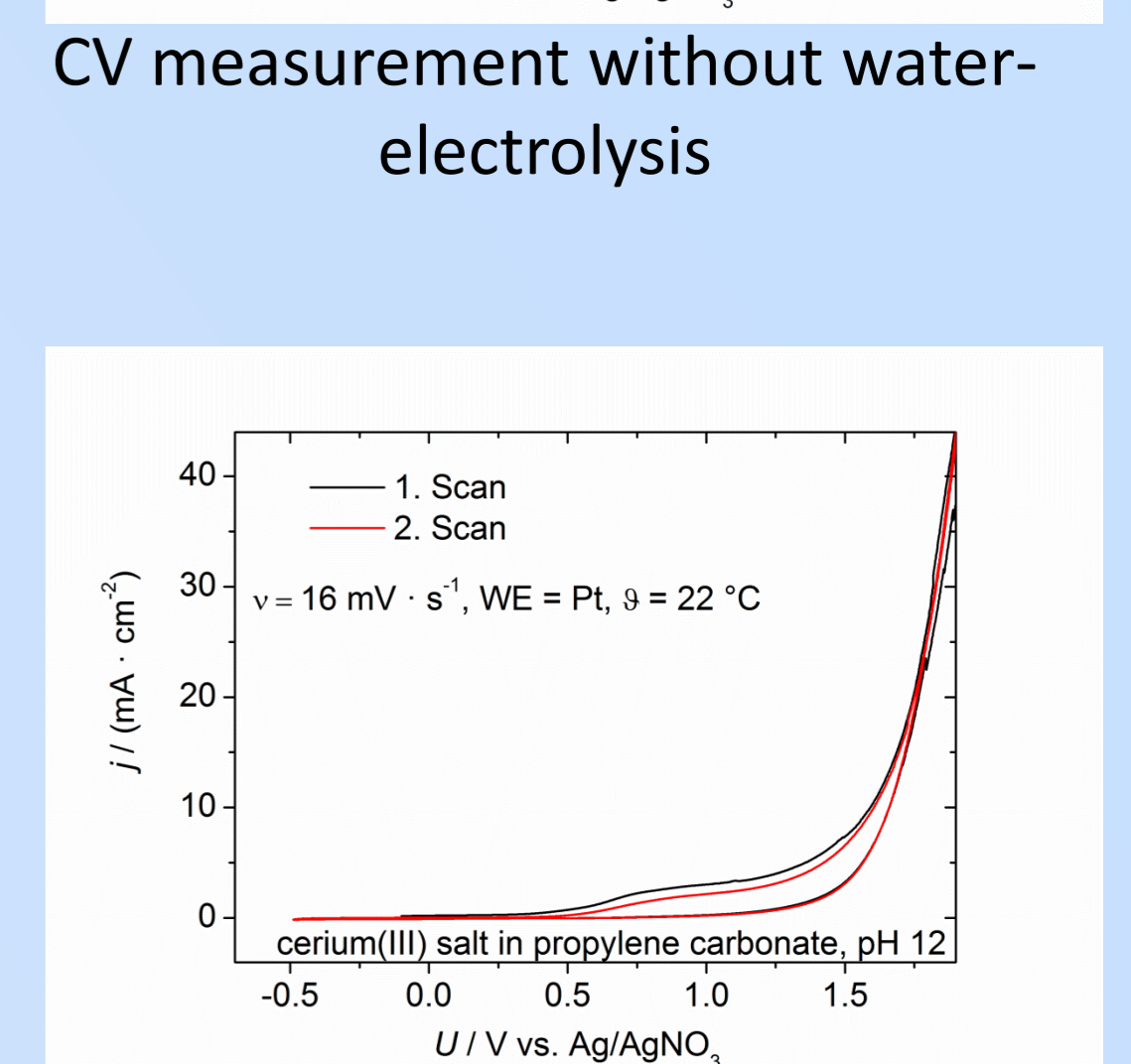
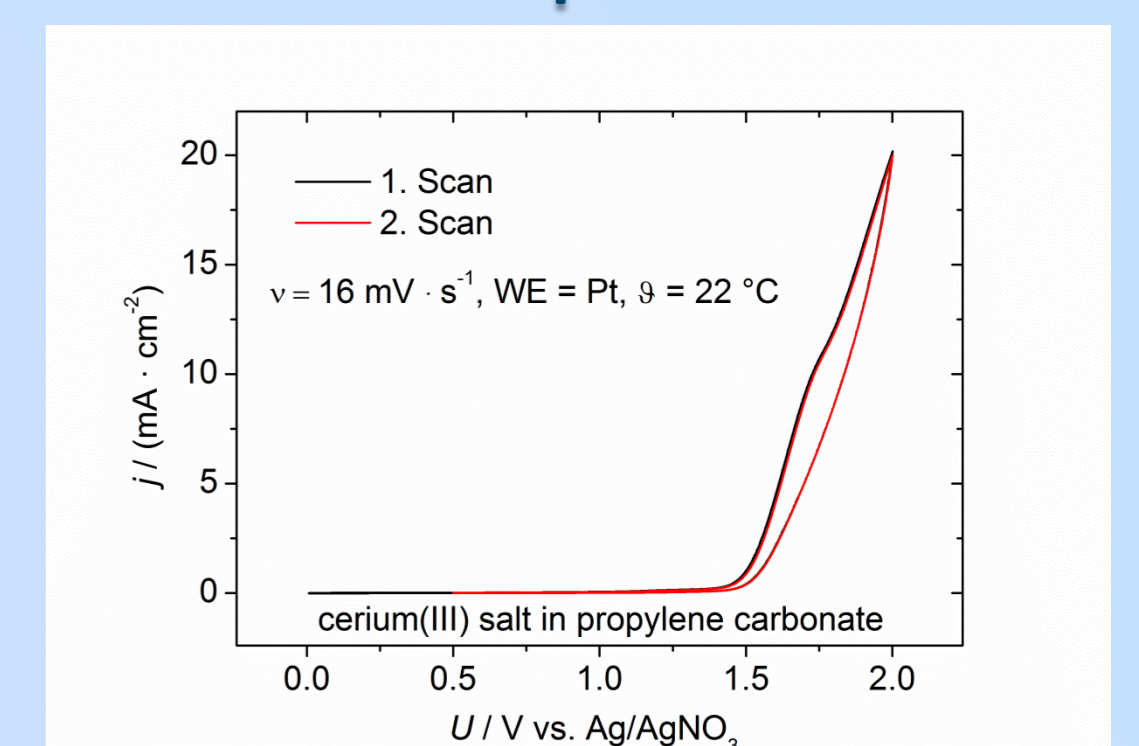
- Working electrode (WE)
- Counter electrode (CE)
- Reference electrode (RE)

Results

Aqueous



Non-aqueous



Conclusion

- Change of redox state from cerium(III) to cerium(IV) in an aqueous electrolyte to the solid oxide is possible
- Microstructured thin-layers of ceria could be obtained in aqueous solutions
- Thin layers are cracky; water electrolysis during deposition
- Phase transfer is an easy and cheap method to transfer the cerium(III)-cation to an organic solvent
- Change of redox state from cerium(III) to cerium(IV) in a non-aqueous electrolyte is possible

Literature:

- [1] V. V. Kharton, F. M. Figueiredo, L. Navarro et al.; *J. Mat. Sci.* **2001**, *36*, 1105-1117
- [2] J. R. Jurado; *J. Mat. Sci.* **2001**, *36*, 1133-1139
- [3] C. Kleinogel, L. J. Gauckler; *Solid State Ionics* **2000**, *135*, 567-573
- [4] A. Asati, S. Santra, C. Kaitanis et al.; *Angew. Chem. Int. Ed.* **2009**, *48*, 2308-2312
- [5] T. D. Golden, A. Q. Wang; *J. Electrochem. Soc.* **2003**, *150*, C621-C624

Acknowledgements:

The authors want to acknowledge the Deutsche Forschungsgemeinschaft (DFG) for funding within the project "CeO₂-basierte Oxide als redoxaktive Funktionsmaterialien für Austausch und Speicherung von Sauerstoff".