Kick-off Workshop
Etablierung von Forschungspräsenzen mit Partnern in Asien/Ozeanien
21. und 22. November 2017
### Organization of the Fraunhofer ICT

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Prof. Dr. P. Elsner

#### Deputy Directors
W. Eckl, Prof. Dr. F. Henning

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Dr. H. Krause
Dr. T. Keicher

#### Energetic Systems
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G. Langer
Dr. J. Neutz

#### Applied Electrochemistry
Prof. Dr. J. Tübbe
Prof. Dr. K. Pinkwart

#### Environmental Engineering
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S. Rühle

#### Polymer Engineering
Prof. Dr. F. Henning
Dr. J. Diemert
Dr. T. Huber

#### General Management
Dr. S. Tröster

#### Fraunhofer ICT-IMM, Mainz, Germany
Prof. Dr. Michael Maskos

#### Project group for New Drive Systems NAS, Karlsruhe, Germany
Dr. H.-P. Kollmeier, Prof. Dr. P. Elsner, Prof. Dr. P. Gumbsch (IWM)

#### Fraunhofer Project Center FPC London (Ontario, Kanada)
Prof. Dr. F. Henning

#### Fraunhofer Project Center for Composites Research, Ulsan, Korea
University New South Wales
Partner at UNSW

Faculty of Chemical Engineering

Faculty of Mechanical and Manufacturing Engineering
1. Project Presentation - Overview

Project goal: Establishing a sustainable joint research group in Australia

Project partner: Fraunhofer ICT / Germany
                J. Tübke, J. Noack
                University of New South Wales / Australia
                C. Menictas, M. Skyllas-Kazacos

Project leader: J. Tübke (ICT), C. Menictas (UNSW)

Coordination: J. Noack (ICT), C. Menictas (UNSW)

Time frame: 2 + 3 Years (5 Years)
            Evaluation after 2 years

Finance: 650 k€ (BMBF), 980 kAUD (UNSW)
          matched funding
1. Project Presentation – Overview

- Project goal: Establishing a sustainable joint research group in Australia

As part of the interlinking of basic research (UNSW: materials, electrochemistry, simulation) and applied research (ICT: system, production), research will focus not only on scientific competencies, but additionally it will always focus on the requirements of the industry, and the research presence will be qualified to work on industry requests at an early stage.

UNSW agreed to match the funding for the needed scientific output with research staff, students and infrastructure (laboratories, equipment, office, IT,...)
1. Project Presentation – Research Topics

- Research topic: “...electrochemical energy storage for renewable energy”
  - Every electrochemical technology which would help to increase the amount of renewable energy in a grid with low cost, high lifetime and safety and low environmental impact

  - Chemical and electrochemical basics of materials and redox couples
  - Development of cell prototypes and properties, and optimisation of cells
  - Efficient cell and battery concepts
  - System prototypes and system properties
  - Battery management development
  - Polymer engineering of components and functional units
  - System behaviour and optimisation during operation within a network
  - Long-term behaviour and ageing behaviour of components and systems
  - Physical, electrical and electrochemical modelling and simulation of half cells, cells and systems
  - Techno-economic modelling
  - Smart grid analysis and optimisation
  - Aspects of safety
  - Material availability and recycling
  - Assessment and verification of conformity
  - Consulting services
  - Standardisation activities
  - Socio-ecological aspects
Redox-Flow-Batteries

- From Materials to Systems

- Materials
- Cell and Stack design
- System
- Simulation
Redox-flow batteries
Materials research

- Material development and characterization
  - Electrode materials
  - Corrosion-stable bipolar plates
  - Separators
  - Long duration stability, aging

- Redox chemistry
  - Optimization of electrolytes
  - Alternative flow batteries, e.g. bromine-based and organic RFBs as well as vanadium-air systems
Oxidation Processes of Vanadium Ions
Cell Upscaling & Stack Development
Redox-flow batteries
System development

- Stacks and systems
  - Design and construction of prototype stacks
  - Development of industrial production techniques
  - System integration, battery management
  - Stack and system tests up to 80 kW DC

- Development of mass storage devices
  - 2,000 m² Application Center Redox-Flow incl. 20 MWh redox-flow battery with 2 MW wind energy plant
  - Support in approval procedures
  - Rating of battery mass storage devices
  - Simulation of microgrids
Project Example: “RedoxWind”
Storing wind energy

- **Flagship project RedoxWind**: Storing fluctuating renewable energy in megawatt scale
  - Development and construction of a 2 MW / 20 MWh redox flow battery system
  - Coupling of the battery to the DC link of a 2 MW wind turbine on ICT Campus
  - Development of an economical production method of RFB stacks in industrial scale
  - Synergies in power electronics for the coupling of wind turbine and battery
## 1. Project Presentation – Time frame

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1. Project Presentation – Current structure

**FHG Central Management**
- **Research Contracts** - Reichl
- **International Development** - P5 - Bierdümpe
- **Law B8**

**ICT**
- Jens Noack
- Jens Tübke

**UNSW**
- Chris Menictas
- Maria Skyllas-Kazacos

**ZENITH**

**Research**

**Acquisition**
- Eric Mariot

**Project Management**
- Anke Hartmann
- Carolyn Fisher

**IT**
- Benjamin König
- Wolfgang Koppenhöfer

**Public Relations**
- Stefan Tröster
- Karolina Zack
- Alex Wolf
- Daniela Maier
## 1. Project Presentation – Finances (BMBF)

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# 1. Project Presentation – Workshops

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## 2. Internal WS with external Expert in Australia
- **Duration:** 1 Day
- **People:** 10
- **Catering (30 €/Person):** 300
- **Workshopmaterial:** 100
- **Cost external expert:** 2500

## 4. Internal WS with AUS scientist in Germany
- **Duration:** 2 Days
- **People:** 7
- **Catering (30 €/Person):** 420
- **Workshopmaterial:** 70
- **Travel cost:** 1950
- **Hotel cost (81 €/night):** 324

## 2. External WS in Australia
- **Duration:** 1 Day
- **People:** 50
- **Catering (30 €/Person):** 1500
- **Workshopmaterial:** 500
- **Technics:** 30
2. Strategic Goals and Final Form of the Cooperation

- Signing MoU November 14th 2017, UNSW
2. Strategic Goals and Final Form of the Cooperation

- First Joint Workshop November 15\textsuperscript{th} 2017, UNSW
Public relation work

- Website www.cenelest.org
Public relation work

- Twitter Account @CENELEST
Next steps

- 6 Students at Fraunhofer ICT and UNSW will start 3 joint research projects in March 2018
- PhD Students will start August 2018