Why I applied for the ERC Synergy Grant

Volker Hessel, University of Adelaide, Australia

- **Had ERC Advanced Grant and ERC Proof of Concept**
- **Had FET Open Grant**
- **Love fundamental science, with (long) view to impact**
- **Think BIG!**
- **Wanted to explore a specific topic with specific colleagues; was rejected by large national fund**
- **Kept and widened topic, added two colleagues = ERC Synergy**
- **Like collaborative research**
- **Love programmatic, interdisciplinary research**
- **Grant scheme with impact and momentum**
- **Retro perspective: to keep relations with Europe**

How I did it

- Talked to good colleague and friend and decided to go
- We then added a person I know well and a person known only from distance = team of four
- We decided early on the proposal lead
- We had one kick-off meeting, few online meeting, and one meeting as we were selected for interview
- We had initial brainstorming discussion, and then worked for several months consistently on the proposal
- The proposal head was the ‘writing motor’
- We made a list of all conceivable questions and had a selected number of extra slides for interview questions
- We agreed on key messages and key data, e.g. CO_2 reduction
- We agreed on who to talk, how to signal, and for what

ERC Synergy Grant 2018

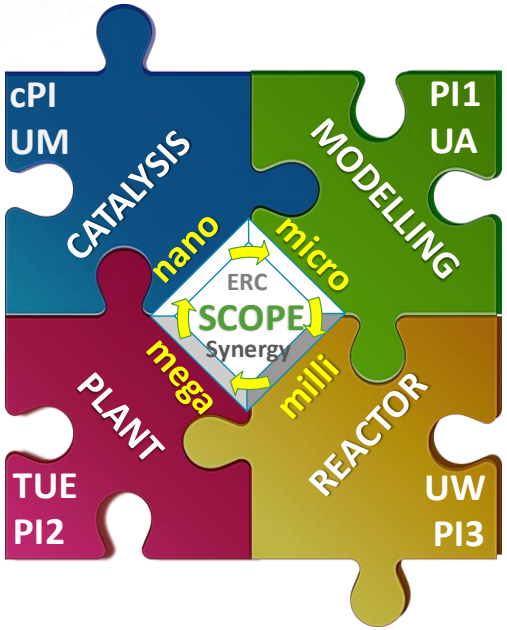
Surface-COnfined fast-modulated Plasma for process and Energy intensification in small molecules conversion

Università degli Studi di Messina

cPI: Gabriele CENTI

PI2: Volker HESSEL

TU/e Technische Universiteit Eindhoven University of Technology



Universiteit Antwerpen

PI1: Annemie BOGAERTS

PI3: Evgeny REBROV

WARWICK
THE UNIVERSITY OF WARWICK

SCOPE

Vision

SCOPE develops innovative approaches for the direct and energy-efficient conversion of N_2, CH_4 and CO_2 using renewable energy, thus addressing relevant key aspects to establish a cleaner and sustainable future for energy and chemistry, with large impact and ground-breaking character.

Università degli Studi di Messina

cPI: Gabriele CENTI

Universiteit Antwerpen

PI1: Annemie BOGAERTS

WARWICK THE UNIVERSITY OF WARWICK

PI3: Evgeny REBROV

TU/e Technische Universiteit Eindhoven University of Technology

PI2: Volker HESSEL

Project impact(s)

HIGH-LEVEL

SUSTAINABLY-INTENSIFYING

- **Chemical Production of the Future**
  - ***Electrified & intensified chemical processes*** (large scale)

  → much more environmentally friendly, at similar/better costs

TRANSLATIONAL

- **Smart Production, Chemistry on Wheels** (small scale)
  - **Distributed processes**, artificial leaf

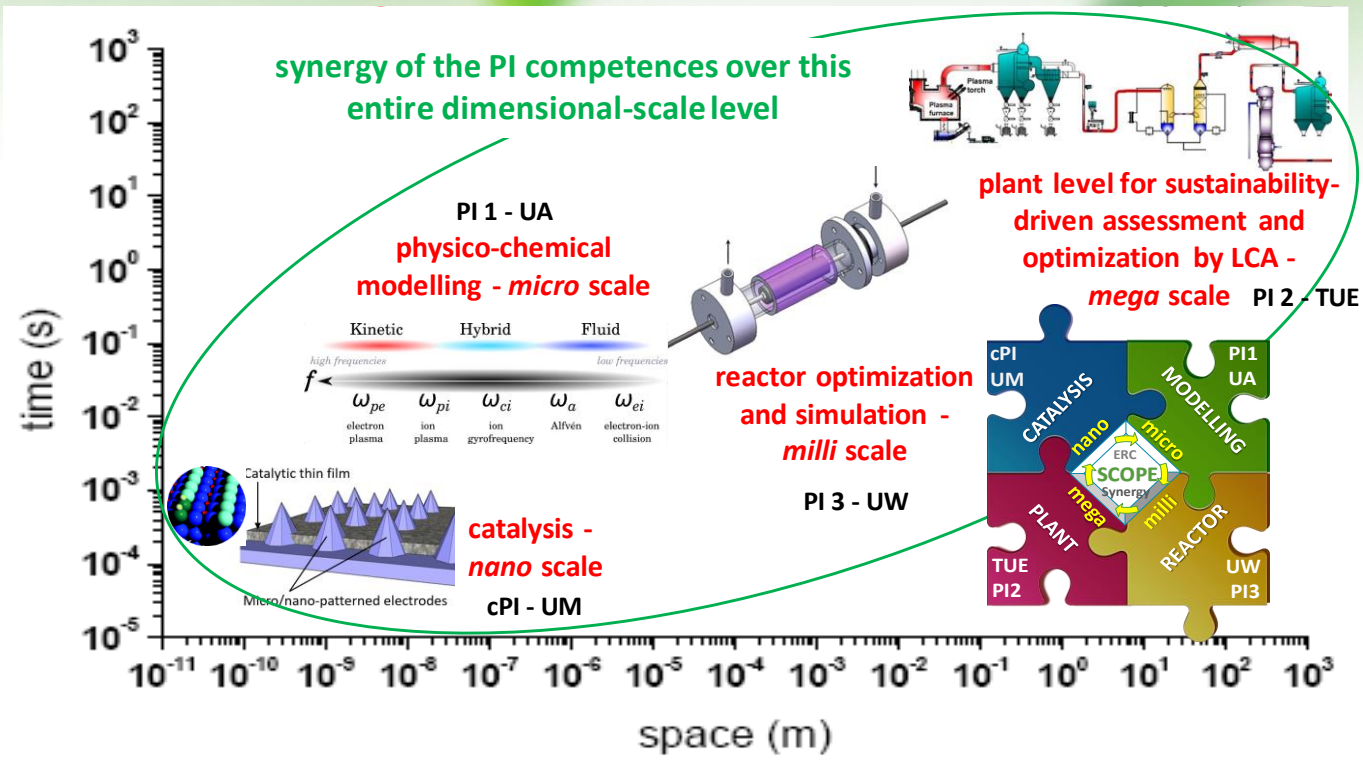
MEGA-TRENDING

(flexible scale)

- **Energy -** chemical storage, smart grids, fossil-free
- **AgriFood –** sustainable landscapes, population growth

SCOPE project provides the science and base knowledge to pass to further implementation stages

Research program & strategy



nano

catalyst development

micro

modelling plasma-generated species

milli

reactor design

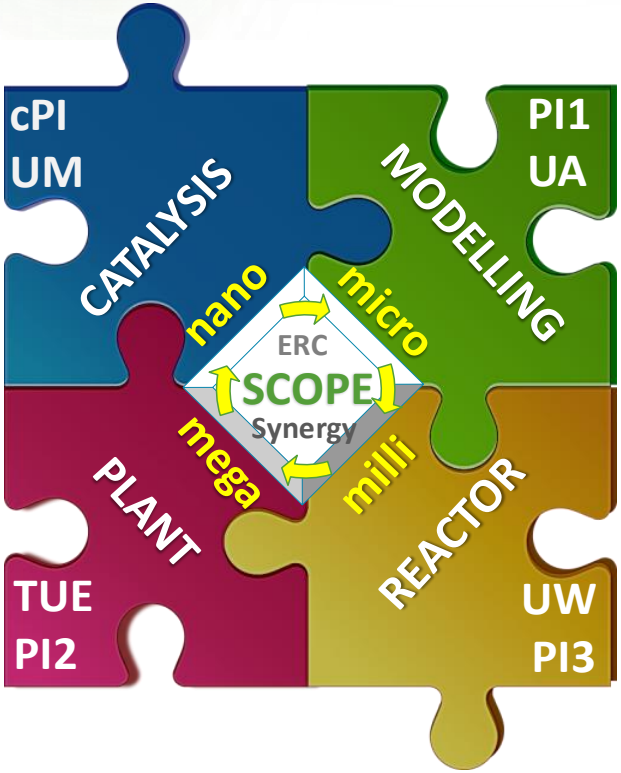
mega

plant level for sustainability-driven opportunity guidance and impact assessment

Need for synergy over multi space- and time domains

Complementary competences

Gabriele CENTI
catalysis



Annemie BOGAERTS
plasma/modelling

Volker HESSEL plasma processing & sustainability assessment

Evgeny REBROV
reactor engineering, non-conventional energy

- Existing bilateral collaborations (common papers, exchange of students) → see part B1
- ERC SyG will allow to pass to a **SYSTEM SYNERGY**

AMMONIA AND SUSTAINABILITY / ESG

https://nutrien-prod-asset.s3.us-east-2.amazonaws.com/s3fs-public/uploads/2021-04/ESG%20Report%202021.pdf

"There is significant existing global infrastructure for the hydrogen and ammonia industry, … However, the social license of ammonia as a fuel remains uncharted territory."

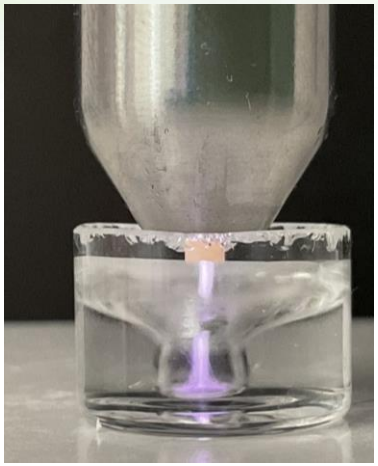
https://www.ammoniaenergy.org/articles/the-social-license-to-operate-low-and-zero-carbon-ammonia-energy-projects/

ESG in flow chemistry Nguyen, Hessel et al. Green Chemistry 24 (2023) 8879-8898.

CURRENT COLD PLASMA WORK IN OUR GROUP

5 Post-docs, 6 PhD

Bogaerts, Centi, Hessel, Rebrov, *Unconventional Catalysis*, Catalysis Today 420 (2023) 114180



Carbon 198 (2022) 22
React Chem Eng 5 (2020) 1374
Chem Eng J 452 (2023) 139164

Submerged plasma jets

N-doped carbon nanodots

Plasma bubble reactor

NO_3^-, NO_2^-, NH_4^+ fertigation solution

Chem Eng J 417 (2021) 129355
Physics of Plasmas 28 (2021) 013502
Plasma Chem Plasma Process 42 (2021) 619

Charged-injector microplasma

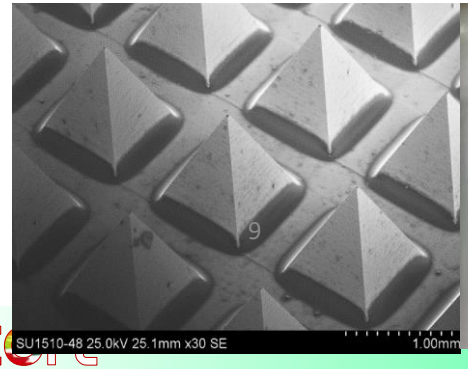
NH_3, Ethylene/Ethane, NOx

Plasma for Flavour

Strawberries, Wine
with G. Warne, I. Fisk, U Nottingham

Food Sci 86 (2021) 3762

The University of Nottingham



ROYAL ADELAIDE SHOW
Presenting Partner bankSA

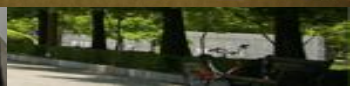
is the longest-running event on the South Australian calendar

- Around 500,000 visitors
- >450 exhibitor stands

Royal Agricultural & Horticultural Society of SA

‘New Economy’: At-Farm plant

‘Old Economy’: Central plant



ERC GRANTS

Before the Project

- A grant scheme not existing in AUS/NZ & accessible
- Grant writing/preparation was finally not so much work … yet for the coordinator
- Important is to have the right team and topic
- Important to start early
- Write the project proposal programmatically
- Write for ‘non-experts’ – plain, layman terms
- Have a good interview and train, train, train, …
- Be aware of your true strengths (authentic)
- “… why this topic … why we …”

ERC (and FET OPEN) GRANTS

During the Project

- Project allows to investigate fundamental ideas ('research dream') over long time = programmatic research
- 'At scale' - sufficient personnel and budget (like Laureate or CoE)
- Great experience for students, post-docs
- Never goes without problems
- Team formation is 'fine art'
- Great engagement & outreach opportunity
- Multiplicity of tasks, ambassadorial activities
- Administration for me is lean, and have great local (UK) support

ERC GRANTS

After the Project

- Seed for follow-up funding, start-up, new ideas, …
- Can shape your career
- Have more and better contacts; more sense for impact
- Remains present and active