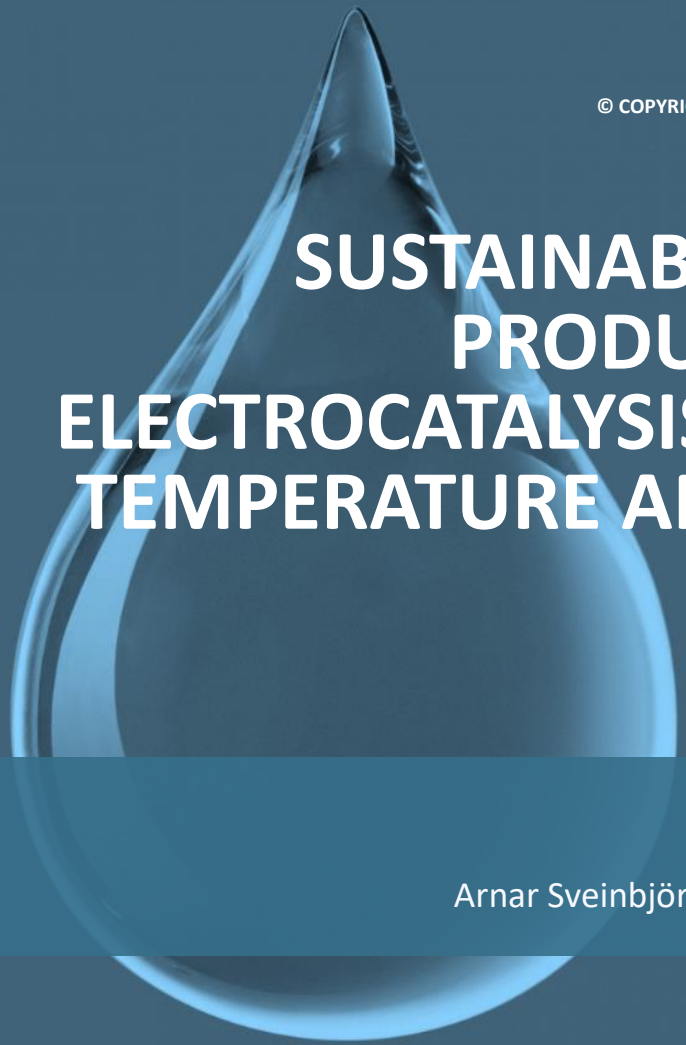
Atmonia

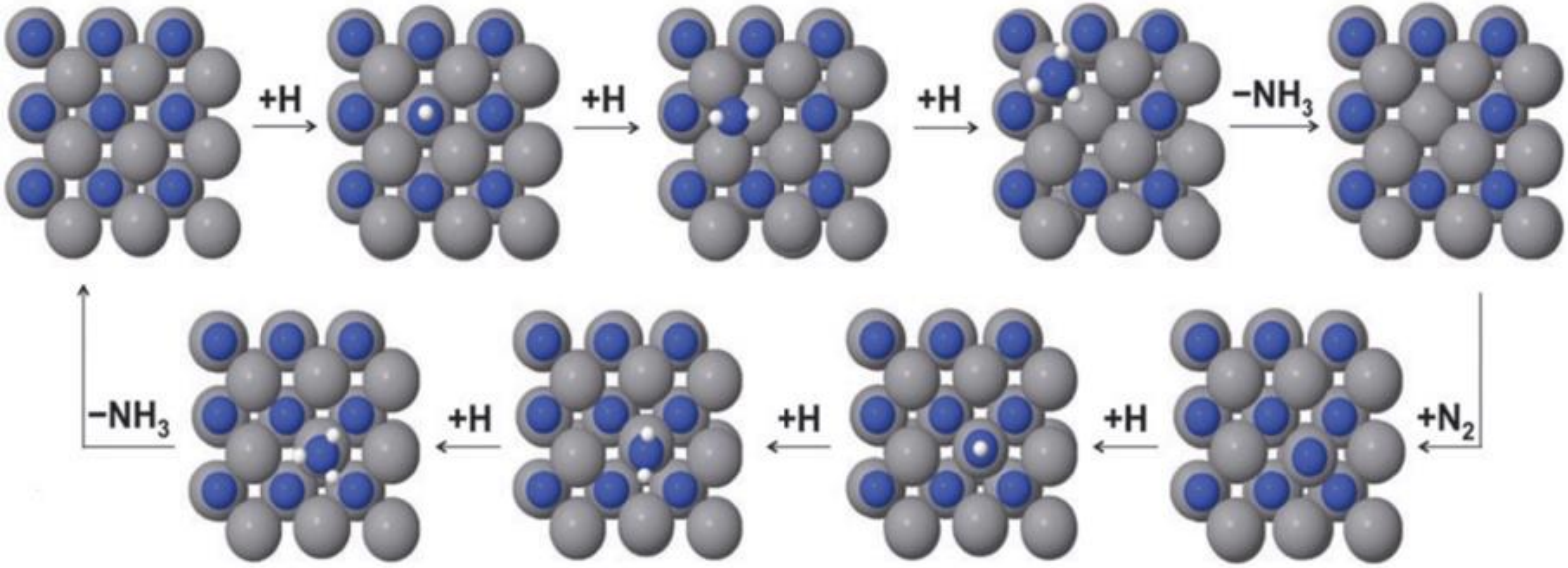
SUSTAINABLE AMMONIA PRODUCTION USING ELECTROCATALYSIS AT AMBIENT TEMPERATURE AND PRESSURE



Arnar Sveinbjörnsson | CTO | October 2018

Selective catalysts proposed by DFT calculations

Mars-van Krevelen mechanism on transition metal nitrides, RS(100)

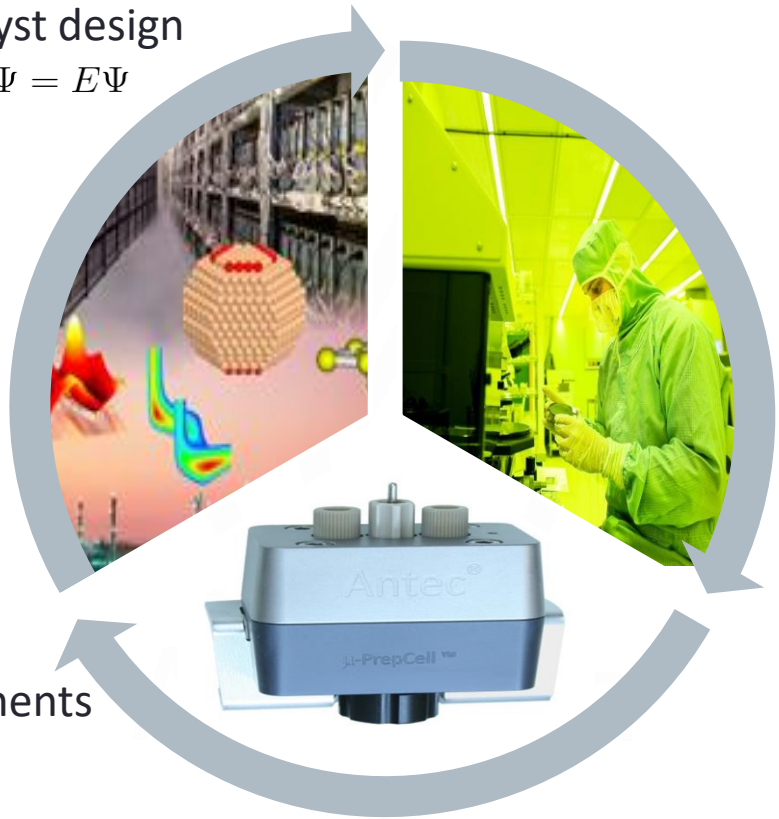


[1] Abghoui, Garden, Howalt, Vegge and Skúlason, *ACS Catalysis* **2016**

Iterative methodology for catalyst development

Catalyst design

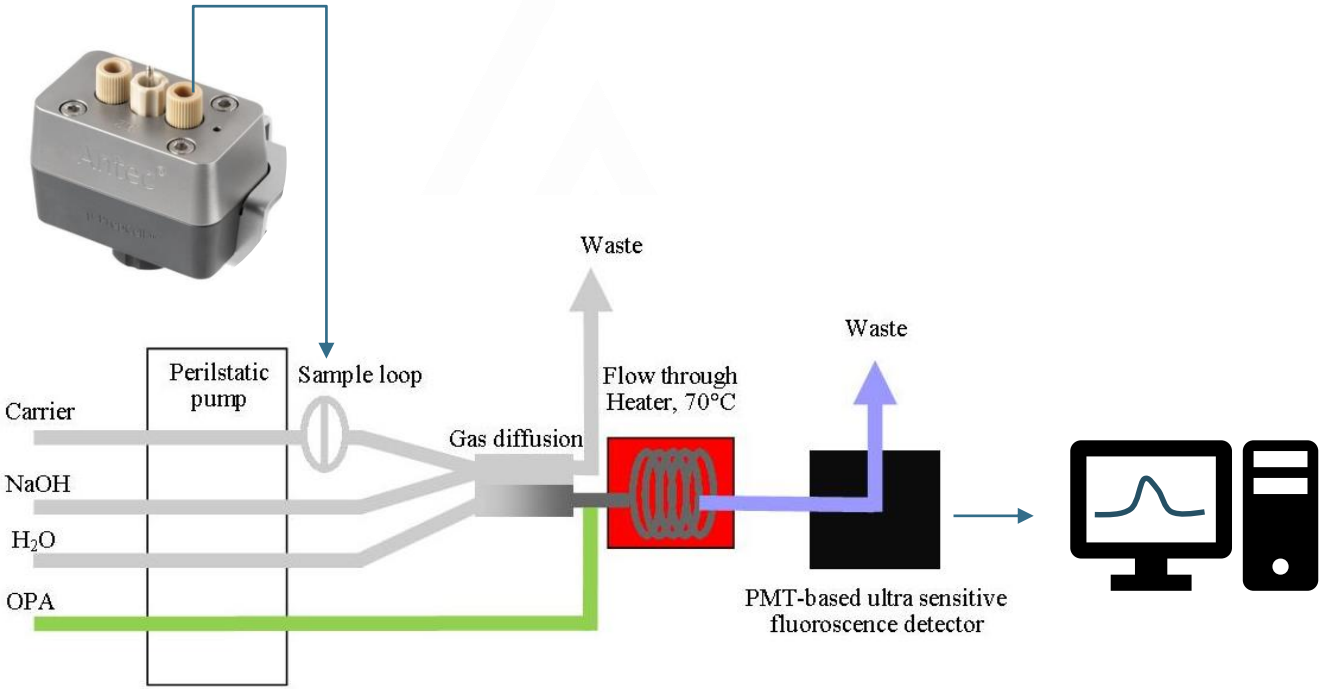
$$\widehat{H}\Psi = E\Psi$$



Catalyst synthesis and characterization

Electrochemical experiments and chemical analysis

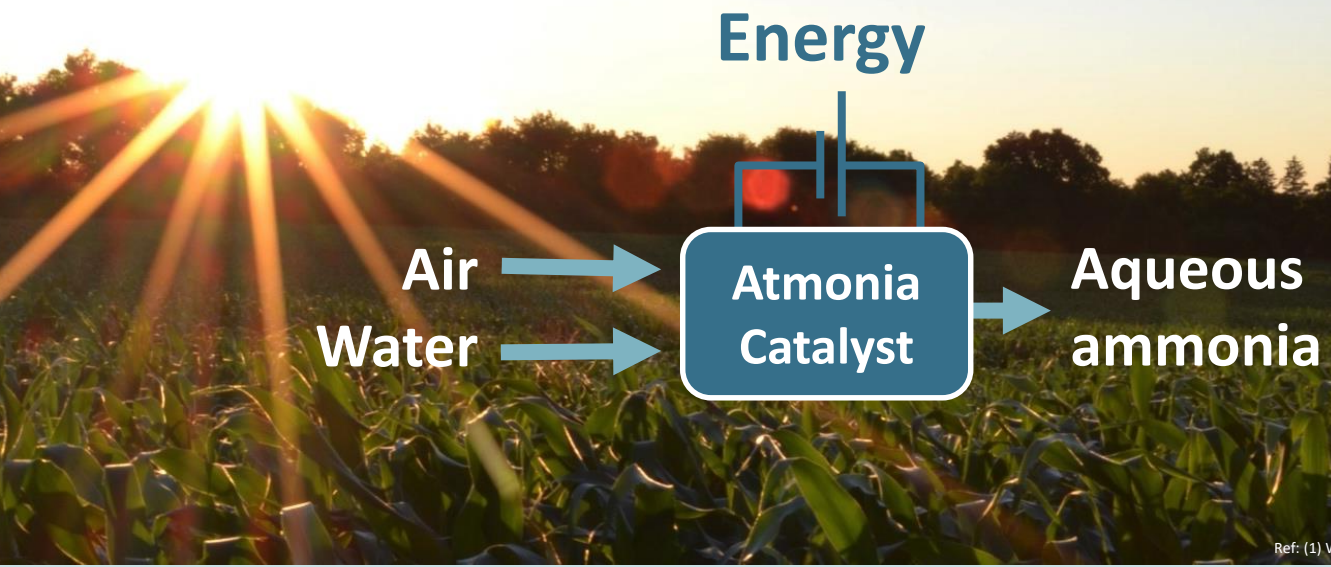
Electrochemical experiments and ammonia analysis



Experiments with polycrystalline ZrN

[2] To be submitted

The Atmonia process is the future of N-fertilizer production

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ELECTROLYTIC PRODUCTION OF AMMONIA
FIELD
The invention is within the field of process chemistry, and specifically relating to production of ammonia with electrolytic methods, and new catalysts therefor.
INTRODUCTION
Ammonia is one of the most highly produced chemicals worldwide. The industrial ammonia synthesis recognized nowadays as the Haber-Bosch process is the first heterogeneous catalytic

Ref: (1) WO2015189865A1, US20170122173 A1, CA2951377A1, EP3155144A1

ZERO CO_2
Clean process

CHEAP
Abundant catalysts

SCALABLE
Multiple electrochemical units can operate in parallel

EFFICIENT
Direct connection to irrigation

LOCAL
Can work at small scale – low pressure and temperature

Atmonia

THANK YOU

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References

[1] Electroreduction of N2 to Ammonia at Ambient Conditions on Mononitrides of Zr, Nb, Cr, and V: A DFT Guide for Experiments. Younes Abghoui, Anna L. Garden, Jakob G. Howalt, Tejs Vegge, and Egill Skúlason. *ACS Catalysis* **2016** *6* (2), 635-646

[2] (to be submitted) **Theoretically derived catalyst for electrochemical reduction of N_2 to NH_3 – experimental approach**

F. Hanifpour, A. Sveinbjörnsson, Y. Abghoui, F. Magnus, J. Yang, Á.S. Ingason, T.K. Tryggvason, K. Johansson, E. Lewin, F. Eriksson, K. Gíslason, C. Arthur, A.L. Garden, S. Ólafsson, K. Leósson, L. Árnadóttir, H.D. Flosadóttir & E. Skúlason

[3] https://antecscientific.com/detectors-and-analyzers/reaction-cells/uprepcell