Curriculum Vitae, Anders Lyngfelt

Research overview.

Before 1998 Lyngfelt's main field of research was related to fluidized bed combustion: especially the sulphur capture process and the influence of reducing conditions in this process, but also nitrous oxide emission and the progress of combustion.

Lyngfelt has made Chalmers world-leading in chemical-looping combustion (CLC), having worked with development of oxygen-carrier material for the process since 1998 and being first to successfully demonstrate this fundamentally new fuel conversion process in sustained operation in a 10 kW prototype unit for gaseous fuel in 2003. Moreover Chalmers was first to operate a 10 kW CLC unit designed for solid fuel (2006) and was also first to operate CLC with liquid fuels (2011). Chalmers now has more than 4000 h of operational experience of chemical-looping combustion in four units, the largest being a 100 kW dual CFB for solid fuels. This is a third of global operational experience and involves the first successful demonstration of chemical-looping combustion with oxygen carriers based on nickel, iron and manganese oxides, combined oxides like $CaMnO_3$ and $FeTiO_3$, as well as natural minerals (ilmenite and manganese ore), using natural gas, syn-gas, bituminous coal, pet coke, kerosene, wood char and wood pellets as fuels. Under his leadership, Chalmers has investigated more than 500 different oxygen carrier materials in laboratory and more than 70 in actual operation.

In addition to first demonstration of CLC with gaseous, solid and liquid fuels, as well as the first demonstration of the use of a number of monometallic or combined oxygen carriers, the work involves a number of breakthroughs in different aspects of chemical-looping technology, e.g. *i)* Proposal of: chemical-looping steam reforming for hydrogen production with simultaneous CO_2 capture, *ii)* Proposal of Chemical-Looping with Oxygen Uncoupling (CLOU), *iii)* Finding the potential for CLOU using oxygen releasing capabilities of a number of combined manganese oxides, i.e. Mn combined with Fe, Ni, Si, Mg and Cu.

Publications

No. of publications:	*241 (Scopus)*	For Chalmers' CLC publications:
Total no: of citations:	*20 297 (Scopus)*	*www.entek.chalmers.se/lyngfelt/co2/co2publ.htm*
Hirsch index*:	*75 (Scopus)*	List of Lyngfelt's publications:
		https://research.chalmers.se/person/anly

Lyngfelt is in the lists 2016/2017/2018/2019 HIGHLY CITED RESEARCHER, Thomson Reuters/Clarivate Analytics/Web of Science, "3,000 highly cited researchers in 21 fields of the sciences and social sciences". "In recognition of ranking among the top 1% researchers for most cited documents, in their specific field".

Lyngfelt has been ranked as the 2nd most productive and cited researcher in Sweden in the area of physics and technology (Fokus, Sveriges Nyhetsmagasin, October 3, 2019).

Lyngfelt was ranked as the 2nd Best Engineering and Technology Scientists in Sweden and No. 149 world-wide: *https://research.com/scientists-rankings/engineering-and-technology/se*

The journal Energy & Fuels has honoured the work by Lyngfelt with a Special Issue: *"Pioneers in Energy Research: Anders Lyngfelt"* including 29 articles on chemical-looping combustion, [1].

Conferences

Lyngfelt brought the *3nd International Conference on Chemical-Looping*, Chalmers, Gothenburg 2014, with 180 participants to Sweden.

Lyngfelt further initiated the start of a new conference series:

> 1st *International Conference on Negative CO_2 Emissions*,
> http://negativeco2emissions2018.com
> Chalmers, Gothenburg, Sweden, May 22-24, 2018.

The conference had 300 participants, 11 plenaries, 150 orals/papers. Further, Chalmers was entrusted with holding the 2nd conference, [2]:

2nd *International Conference on Negative CO_2 Emissions*, http://negativeco2emissions2020.com, Chalmers, Gothenburg, Sweden, June 14-17, 2022, [3].

The 2nd conference had 315 participants, 12 keynotes and 140 orals/papers.

All the three conferences were organized by Carl Linderholm.

Research projects

Through a number of international research projects, see below, Lyngfelt has been in close collaboration with appr. 25 companies, universities and research institutes. The major part of the funding of Lyngfelt's CLC research has come from EU, with a total budget for his research of 10 M€. Thus, he has been deeply involved in the conception of ten EU/ EU-RFCS projects on CLC and coordinated several:

- GRACE 2002-2003, coordinated by BP. CLC part proposed and led by Lyngfelt.
- CCCC 2001-2004, EU-RFCS project coordinated by Lyngfelt.
- ENCAP IP-project 2004-2007, CLC part for solid fuels proposed by Lyngfelt with support of Alstom.
- CLC Gas Power, 2006-2008, EU-project coordinated by Lyngfelt.
- Cachet, IP-project, 2006-2008, coordinated by BP, CLC part led by Lyngfelt.
- ECLAIR, 2008-2012, EU-RFCS project coordinated by Alstom. Project based on experimental work by Chalmers in ENCAP and initiated by Lyngfelt.
- INNOCUOUS, 2010-2013, EU-project coordinated by Lyngfelt
- $NoCO_2$, 2012-2017, ERC Advanced Grant, Principal Investigator Anders Lyngfelt
- ACCLAIM, 2012-2013, EU-RFCS project coordinated by Lyngfelt
- SUCCESS, 2014-2018, EU-project co-ordinated by Techn. Univ. of Vienna, based on proposal by Lyngfelt

Moreover Lyngfelt coordinated the Nordic CO_2 Sequestration Programme ($NoCO_2$), 2003-2006, funded by Nordic Energy Research. He also coordinated the Nordic Project "Negative CO_2", 2015-2020, one of three flagship projects selected for funding out of >100 applications.

To be noted is that Lyngfelt has received an ERC Advanced Grant ($NoCO_2$ above) as well as a prestigious "Forskningsmiljö" from Swedish Research Council, *i.e.* appr. 2.5 M€ during 6 years (2017-2022).

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1) Haibo Zhao, 2022 Pioneers in Energy Research: Anders Lyngfelt, *Energy Fuels* 36:17 (2022) 9365–9370

2) The series is now well established and the 3rd conference will be hosted by CO2RE, Oxford, UK, June 18-21, 2024.

3) The conference was delayed two years because of the pandemia.