



Università degli Studi di Napoli Federico II
Scuola Politecnica e delle Scienze di Base

Ph.D. in Chemical Sciences

Chemical Reactors for Solid-Gas Processes Aimed at Energy Production

Relevance of solid-gas processes in the international socio-economic/energetic scenario. Biomasses and coal: generalities, characteristics, ultimate and proximate analysis. Thermo-conversion (combustion/gasification) processes for biomasses and coal.

[PTS lecture #1]

Fixed bed reactors, minimum fluidization conditions, fluidized bed reactors. Two-phase theory of fluidization, entrainment, elutriation.

[PITR lecture #14]

Fluidized bed combustors: characteristics, in situ desulphurization.

[PITR lecture #16; Koornneef et al., 2007; Scala et al., 2013]

Gasification of biomasses and coal for syn-gas production: generalities, characteristics, combined cycles in entrained-flow reactors.

[PTS lecture #8]

Carbon capture and storage to limit greenhouse effect: generalities, characteristics, post-combustion CO₂ capture by means of calcium looping in dual interconnected fluidized bed systems.

[PITR lecture #17; Blamey et al., 2010; Zhao et al., 2013; Coppola et al., 2013 and 2015]

References:

J Blamey, EJ Anthony, J Wang, PS Fennell. *Prog. Energy Combust. Sci.*, 36 (2010) 260-279.

A Coppola, F Scala, P Salatino, F Montagnaro. *Chem. Eng. J.*, 231 (2013) 537-543.

A Coppola, L Palladino, F Montagnaro, F Scala, P Salatino. *Energy Fuels*, 29 (2015) 4436-4446.

J Koornneef, M Junginger, A Faaij. *Prog. Energy Combust. Sci.*, 33 (2007) 19-55.

F Scala, R Solimene, F Montagnaro. In: *Fluidized Bed Technologies for Near-Zero Emission Combustion and Gasification*, Chapter 7, pp. 352-368, Woodhead Publishing, Cambridge (UK), 2013.

M Zhao, AI Minett, AT Harris. *Energy Environ. Sci.*, 6 (2013) 25-40.

Web-learning "federic@" lectures:

<http://www.federica.unina.it/corsi/processi-impianti-trattamento-reflui/> (PITR lectures #14,16,17);

<http://www.federica.unina.it/corsi/processi-termoconversione-solidi/> (PTS lectures #1,8).

The course may take place in June/July 2017, or January/February 2018.

If you are interested, please contact Prof. Montagnaro for schedule, and for further information.

Napoli, March 2017.

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