CURRICULUM VITAE Benedetta de Caprariis

PERSONAL INFORMATION

Surname, First Name: de Caprariis, Benedetta

Scopus Author ID: 55228192900

Date of birth: 02 August 1983

Marital status: married, two children.

Nationality: Italian

EDUCATION

Feb/2013	Ph.D. in Chemical Engineering, Sapienza Università di Roma, thesis title "Combustion and gasification of solid fuels", advisor Prof. N. Verdone.
July/2009	Master degree in Chemical Engineering (110/110), Sapienza Università di Roma, thesis title (translated from Italian) "Study of an oxy-combustion process working in flameless conditions", advisor Prof. N. Verdone.
Dec/2006	Bachelor degree in Chemical Engineering (104/110), Sapienza Università di Roma, thesis title (translated from Italian) "Design of process furnace", advisor Prof. B. Mazzarotta.

CURRENT POSITIONS

Nov/2015-present Assistant Professor at the Chemical Engineering Department of Sapienza Università di Roma (RTD-A, temporary position).

PREVIOUS POSITIONS

June/2015-Oct/2015 Research fellow at the Chemical Engineering Department of Sapienza Università di Roma.

Jan/2013-May/2015: Post-Doc at the Chemical Engineering Department of Sapienza Università di Roma.

Nov/2009-Oct/2012: Ph.D. fellowship at the Chemical Engineering Department of Sapienza Università di Roma.

TEACHING ACTIVITIES

2016-present	Professor of the course "Chemical Engineering Processes" (3 c.f.u.), Chemical Engineering (B.Sc.)
2016-present	Professor of the course "Laboratory of production of micro and nano particles" (3 c.f.u.), Nanothecnology Engineering (M.Sc.)
2019	Professor of the Ph.D. Course "Hydrogen Production and Introduction to Fuel Cells", Ph.D. in Chemical Engineering
2018	Professor of the Ph.D. Course "Pro II simulations of methane steam reforming: Thermodynamic study", Ph.D. in Chemical Engineering
2011-2013	Teaching assistant for the course of "Industrial Organic Chemistry", Chemical Engineering (B.Sc.)
2011-2013	Teaching assistant for the course of "Chemical Engineering Processes", Chemical Engineering (B.Sc.)

FUNDINGS

2019-present	Industrial research project funded by Ginevri s.r.l "Selection of the polymer for bio-medical applications" (9000 Euros)
2018-2019	Industrial research project funded by Conser "Optimization of operative parameters of a stirred vessel by means of CFD" (9000 Euros)
2016-2018	Research project funded by Sapienza University of Rome "Development of an efficient one step process for the production of high quality bio-oil" (10000 Euros)

SPECIALIZATION COURSES

2012 Specialization courses held at University of Carlo III, Madrid "Biomass utilization" (Prof. Naoko Ellis) and "Large-scale fluidized bed combustion, modeling and mixing" (Prof. David Pallarès)

2010 Ph.D. School in Chemical Engineering (GRICU)

RESEARCH ACTIVITY

Hydrothermal liquefaction

I studied and optimized the operative parameters of the hydrothermal liquefaction (HTL) of biomass. I developed metallic Fe catalysts for the partial up-grading of the bio-crude in the HTL reactor, exploiting the water oxidation of iron to produce hydrogen. Bio-crude with significantly improved yield and quality was obtained. I also developed metallic Ni catalyst with nanostructured surface to be used as hydrogenation catalyst I demonstrated the hydrogenation power of Ni. I am currently testing the combined action of Fe and Ni to hydrogentate bio-crude with the H2 produced by Fe. [1;3;13]

Production of clean syngas

I proposed an innovative lab-scale gasifier able to produce a syngas free of tar. The pyrolysis step is separated from the gasification one, the device can operate as a down-draft or up-draft gasifier and the plant is equipped with a reforming unit. The uniqueness consists in the compactness which reduces the heat losses avoiding the problem of tar condensation. In this context, we successfully tested biochar as adsorbent for tar and a Ni-Co/Al2O3 catalyst for tar reforming. [4;5;8;10;11;14;15;18;21]

Biochar as an adsorbent

I produced chemically activated bio-char directly from biomass to be used as adsorbent in wastewater treatments. The activated bio-char was used to adsorb organic compounds from pyrolysis water achieving performances higher than those of activated carbon. [9;12]

Pyrolysis kinetic modeling

I proposed and developed a kinetic model for coal and biomass pyrolysis starting from the Distributed Activated Energy Model (DAEM). To take into account primary and secondary pyrolysis, the model was implemented with a combination of 2 Gaussian distributions (2-DAEM). The model fits very well experimental data ($R2>0.999$) for coal and biomass, and identifies and weighs clearly the two steps of the pyrolysis. [20;24;30;31]

Spinning Disc Reactor

I developed a CFD model with Ansys Fluent to simulate a Spinning Disc Reactor for the production of nanoparticles by reaction-precipitation. The model allows one to identify the best operative conditions in order to obtain particles of small dimensions, correlating the particle diameter with the rotational speed and the residence time of reagents on the disc surface. [22;29;34]

ORGANIZATION ROLES

2018-present Member of the International Scientific Committee of the congress *International Symposium on Gasification and its Application* (ISGA) 6th and 7th edition

2018-present Member of the International Biomass/waste Energy and Environment Collaborative Network (IBEE-RCN); the meeting was held in Tianjin (China) in Oct 2018 and May 2019.

PUBLICATIONS

1	de Caprariis, B., Bracciale, M.P., Bavasso, I., Chen, G., Damizia, M., Genova, V., Marra, F.,. Paglia, L., Pulci, G., Scarsella, M., Tai, L., De Filippis, P. Unsupported Ni metal catalyst in hydrothermal liquefaction of oak wood: Effect of catalyst surface modification (2020) Science of The Total Environment, 709, pp. 1-9.
2	Vilardi, G., De Caprariis, B., Stoller, M., Di Palma, L., Verdone, N., Intensified water denitrification by means of a spinning disk reactor and stirred tank in series: Kinetic modelling and computational fluid dynamics (2020) Jopurnal of Water Process Engineering, 34
3	de Caprariis, B., Bavasso, I., Bracciale, M.P., Damizia, M., De Filippis, P., Scarsella, M., Enhanced bio-crude yield and quality by reductive hydrothermal liquefaction of oak wood biomass: Effect of iron addition (2019) Journal of Analytical and Applied Pyrolysis, 139, pp. 123-130.
4	Ancona, V, Barra Caracciolo, A., Campanale, C., de Caprariis, B., Grenni, P., Uricchio, V.F., Borello, D., Gasification treatment of poplar biomass produced in a contaminated area restored using plant assisted bioremediation (2019) Journal of Environmental Managment, 239, pp.137-141.
5	Bracciale, M.P., de Caprariis, B., De Filippis, P., Hernandez, A.D., Scarsella, M. New synthetic route for the production of mayenite support to enhance Ni resistance to coke deposition in the reforming of tar model compounds (2019) Applied Catalysis A: General, 574, pp. 48-59.
6	Ruocco, C., De Caprariis, B.*, Palma, V., Petrullo, A., Ricca, A., Scarsella, M., De Filippis, P. Methane dry reforming on Ru perovskites, AZrRuO 3 : Influence of preparation method and substitution of A cation with alkaline earth metals (2019) Journal of CO2 Utilization, 30, pp. 222-231.
7	Bracciale, M.P., De Caprariis, B., De Filippis, P., Scarsella, M., Steam reforming of model compounds from biomass fermentation over nanometric ruthenium modified nickel-lanthanum perovskites catalysts (2019) Chemical Engineering Transactions, 73, pp. 19-24.
8	De Caprariis, B., Bassano, C., Bracciale, M.P., Deiana, P., Hernandez, A.D., Santarelli, M.L., Scarsella, M., De Filippis, P., Biomass Gasification: The Effect of the Surface Area of Different Materials on Tar Abatement Efficiency (2019) Energy and Fuels, (in press) .
9	De Caprariis, B., De Filippis, P., Petrucci, E., Scarsella, M. Activated biochars used as adsorbents for dyes removal (2018) Chemical Engineering Transactions, 65, pp. 103-108.
10	Bracciale, M.P., De Caprariis, B., Bassano, C., De Filippis, P., Deiana, P., Hernandez, A.D., Scarsella, M. Influence of the catalyst support on the steam reforming performance of toluene as tar model compound (2018) Chemical Engineering Transactions, 65, pp. 241-246.
11	de Caprariis, B., Bracciale, M.P., De Filippis, P., Hernandez, A.D., Petrullo, A., Scarsella, M. Steam reforming of tar model compounds over ni supported on CeO2 and mayenite (2017) Canadian Journal of Chemical Engineering, 95 (9), pp. 1745-1751.
12	de Caprariis, B., De Filippis, P., Hernandez, A.D., Petrucci, E., Petrullo, A., Scarsella, M., Turchi, M. Pyrolysis wastewater treatment by adsorption on biochars produced by poplar biomass (2017) Journal of Environmental Management, 197, pp. 231-238.
13	de Caprariis, B., De Filippis, P., Petrullo, A., Scarsella, M. Hydrothermal liquefaction of biomass: Influence of temperature and biomass composition on the bio-oil production (2017) Fuel, 208, pp. 618-625.
14	Borello, D., Pantaleo, A.M., Caucci, M., de Caprariis, B., De Filippis, P., Shah, N. Modeling and experimental study of a small scale olive pomace gasifier for cogeneration: Energy and profitability analysis (2017) Energies, 10 (12)
15	de Caprariis, B., De Filippis, P., Hernandez, A.D., Petrullo, A., Scarsella, M., Verdone, N. Use of low-cost materials for tar abatement process (2017) Chemical Engineering Transactions, 57, pp. 91-96.
16	Scarsella, M., Bracciale, M.P., de Caprariis, B., De Filippis, P., Petrullo, A., Pronti, L., Santarelli, M.L. Improved photocatalytic properties of doped titanium-based nanometric oxides (2017) Chemical Engineering Transactions, 60, pp. 133-138.
17	de Caprariis, B., De Filippis, P., Palma, V., Petrullo, A., Ricca, A., Ruocco, C., Scarsella, M. Rh, Ru and Pt ternary perovskites type oxides BaZr(1-x)MexO3 for methane dry reforming (2016) Applied Catalysis A: General, 517, pp. 47-55.
18	Borello, D., Cedola, L., Frangioni, G.V., Meloni, R., Venturini, P., De Filippis, P., de Caprariis, B. Development of a numerical model for biomass packed bed pyrolysis based on experimental validation (2016) Applied Energy, 164, pp. 956-962.

19	De Filippis, P., de Caprariis, B., Scarsella, M., Petrullo, A., Verdone, N. Biocrude production by hydrothermal liquefaction of olive residue (2016) International Journal of Sustainable Development and Planning, 11 (5), pp. 700-707.
20	de Caprariis, B., Santarelli, M.L., Scarsella, M., Herce, C., Verdone, N., De Filippis, P. Kinetic analysis of biomass pyrolysis using a double distributed activation energy model (2015) Journal of Thermal Analysis and Calorimetry, 121 (3), pp. 1403-1410.
21	de Caprariis, B., Scarsella, M., Petrullo, A., De Filippis, P., Olive oil residue gasification and syngas integrated clean up system (2015) Fuel, 158, pp. 705-710.
22	de Caprariis, B., Stoller, M., Chianese, A., Verdone, N., CFD model of a spinning disk reactor for nanoparticle production (2015) Chemical Engineering Transaction, 43, pp. 757-762.
23	de Caprariis, B., De Filippis, P., Petrullo, A., Scarsella, M., Methane dry reforming over nickel perovsikite catalysts (2015) Chemical Engineering Transactions, 43, pp. 991-996.
24	De Filippis, P., de Caprariis, B., Scarsella, M., Verdone, N. Double distribution activation energy model as suitable tool in explaining biomass and coal pyrolysis behavior (2015) Energies, 8 (3), pp. 1730-1744.
25	Belotti, G., de Caprariis, B., De Filippis, P., Scarsella, M., Verdone, N. Effect of Chlorella vulgaris growing conditions on bio-oil production via fast pyrolysis (2014) Biomass and Bioenergy, 61, pp. 187-195.
26	De Filippis, P., de Caprariis, B., Scarsella, M., Verdone, N. The hydrothermal decomposition of biomass and waste to produce bio-oil (2014) WIT Transactions on Ecology and the Environment, 180, pp. 445-451.
27	de Caprariis, B., De Filippis, P., Di Battista, A., DiPalma, L., Scarsella, M., Exoelectrogenic activity of a green microalgae, chlorella vulgaris, in a bio-photovoltaic cells (bpvs) (2014) Chemical Engineering Transactions, 38, pp. 523-528.
28	de Caprariis, B., Bassano, C., Deiana, P., Palma, V., Petrullo, A., Scarsella, M., De Filippis, P. Carbon dioxide reforming of tar during biomass gasification (2014) Chemical Engineering Transactions, 37, pp. 97-102.
29	D' Intino, A.F., de Caprariis, B., Santarelli, M.L., Verdone, N., Chianese, A., Best operating conditions to produce hydroxyapatite nanoparticles by means of a spinning disc reactor, (2014) Frontiers of Chemical Science and Engineering, 8(2), pp. 156-160
30	Herce, C., de Caprariis, B., Stendardo, S., Verdone, N., De Filippis, P. Comparison of global models of sub-bituminous coal devolatilization by means of thermogravimetric analysis (2014) Journal of Thermal Analysis and Calorimetry, 117 (1), pp. 507-516.
31	de Caprariis, B., De Filippis, P., Herce, C., Verdone, N. Double-gaussian distributed activation energy model for coal devolatilization (2012) Energy and Fuels, 26 (10), pp. 6153-6159.
32	Verdone, N., de Filippis, P., Scarsella, M., de Caprariis, B. Waste gasification in an up-draft fixed-bed gasifier: Experimental study and model validation (2012) WIT Transactions on Ecology and the Environment, 163, pp. 113-122.
33	De Filippis, P., de Caprariis, B., Scarsella, M., Verdone, N. Energy recovery from unused and expired medicines (2012) WIT Transactions on Ecology and the Environment, 163, pp. 125-133.
34	de Caprariis, B., Di Rita, M., Stoller, M., Verdone, N., Chianese, A., Reaction-precipitation by a spinning disc reactor: Influence of hydrodynamics on nanoparticle production (2012) Chemical Engineering Science, 76, pp. 73-80.

INVITED PRESENTATIONS AT INTERNATIONAL CONFERENCES

May/2019 "Activated biochar used as adsorbent in pyrolysis water purification treatments: study of the adsorption of pyrolysis water model compounds", BEE2019 (2nd Symposium on Biomass/waste Energy and Environment) 23-26/05 2019 Tianjin China.

Oct/2018 "Behaviour of different supports on the reforming performances of tar", ISGA 6 (6th International Symposium on Gasification and its Application), 25-28 Oct 2018, Chengdu China.

May/2014 "The hydrothermal decomposition of biomass and waste to produce bio-oil", Waste Management, 12-14 May, Ancona, Italy

Bdc

CONTRIBUTED PRESENTATIONS AT INTERNATIONAL CONFERENCES

2019

- "Biomass hydrothermal liquefaction: use of metal catalysts, Fe, Zn and Ni, to enhance bio-oil yield and quality" ECCE12 (12th European Congress of Chemical Engineering), 15-19 September Florence, Italy.
- "Biochar Characterization from Thermal Utilization of Biomass for Catalytic and Adsorption Applications" EUCBE2019 (27th European Conference and Exhibition) 27-30 May Lisbon, Portugal.

2018

- "A kinetic study on hydrothermal liquefaction of lignocellulosic biomass" EUCBE2018 (26th European Conference and Exhibition) 14-18 May, Copenhagen, Denmark.
- "Activated biochars used as adsorbents for dyes and water pollutants removal" IconBM 2018 (International Conference on Biomass) 17-20 June, Bologna, Italy.

2016

- "Biocrude production by hydrothermal liquefaction of olive residue" Waste Management 2016 (8th International Conference on Waste Management and the Environment) 7 - 9 June 2016, Valencia, Spain.

2015

- "CFD model of a spinning disk reactor for nanoparticle production" and "Methane dry reforming over nickel perovskite catalysts" Icheap 12 (12th International Conference on Chemical and Process Engineering) 19-22 May, Milano, Italy.

2014

- "Biomass gasification and tar reforming in a two-stage reactor" and "A 3D packed bed model for biomass pyrolysis: mathematical formulation and experimental validation" ICAE 6 (6th International Conference on Applied Energy), 30 May-2 June, Taipei, Taiwan.
- "Carbon dioxide reforming of tar during biomass gasification" IconBM 2014 (International Conference on Biomass), 4-7 May, Firenze, Italy.

2013

- "Influence of the heat loss on the performance of a two-stage gasification reactor" International Conference on Energy, Environment, Ecosystems and Development, 16-19 July, Rodi, Grecia.

SCIENTIFIC PRODUCTION

Scopus 39 documents, 480 citations, h-index 12 (Date: 04/02/20)

Rome, 04/02/2020

Benedetta de Caprariis