Curriculum Vitae of Riccardo Chirone

Istituto di Ricerche sulla Combustione - Consiglio Nazionale delle Ricerche
P.le Vincenzo Tecchio, 80 – 80125 Napoli - Italy
Ph.: +39 081 768 (2242) – (2245); +39 331 6083765 - Fax: +39 081n5936936 e-mail:
riccardo.chirone@cnr.it ; chirone@irc.cnr.it ; direttore@irc.cnr.it

Riccardo Chirone is the director of the Institute for Research on Combustion (IRC) del CNR. He earned a MS degree cum laude in Chemical Engineering from Engineering Faculty of the University of Naples Federico II in 1981 and a PhD in Chemical Engineering from the same Faculty in 1986. Riccardo Chirone began his career with the National Research Council as Researcher of the Institute of Research on Combustion of Naples in 1985, and then moved to holding position of increased responsibility, Senior Researcher of the Institute in 1996 and Head of Research since December 2001.

In 1985 he has been Visiting Engineer at the Department of Chemical Engineering of MIT, Cambridge, Massachusetts, USA where he performed research on the behavior of solid carbon particles during fluidized bed combustion in the staff of proff. A. Sarofim e J. Beer. Riccardo Chirone has developed an intense research activity acquiring technical and scientific skills and attitudes of operating strategy that have been frequently measured by taking responsibility for coordination and direction of working groups, and projects: member of the Scientific Council of the Department for Energy and Transport of the CNR (2009-2012), member of the Board of the Institute for Research on Combustion (1988-2008), member of the Coordination Group of the Technology Platform for Sustainable Management of Wastes of the Ministry of Education and Internationalization (2011), member of the Scientific Board of the "Smart Power System District" of the Campania Region (2012 up today), member of the CNR Commission of Experts for the evaluation of Cooperation Proposals in the framework of agreements with foreign counterparts Bodies (2011 e 2012), expert designated by CNR in Commission for Environmental Impact Assessment of the Ministry of the Environment (2005), member of the Coordination Group of the project "Advanced technologies for the integration of the electric production systems" of the Campania Regional Competence Centre on "New Technologies for Production Activities" (2006-2005). He has operated in several positions of responsibility in national and international research projects, including the coordination of projects of the Research Fund for Coal and Steel of the European Union and the coordination of a cluster of CNR Institutes for a PON project. Chirone has been the Chairman of several International Conferences of Fluidization Technologies, Combustion Symposia and Workshops on “Solid Fuels, Waste Combustion and Gasification” and “Attrition Phenomena in Fluidized Bed Combustors”.

Riccardo Chirone is an active researcher in the field of chemical reactors, combustion and gasification processes and process technology of granular solids. Author of about 160 international publications in ISI Journals (about 3420 citations, h-index = 34 @ 03.12.2019 – source Scopus), over 350 publications in Conference proceedings with international and national Peer Review Committee and 4 patents.

The research interests of dr. Chirone are related to three main areas:

- ✓ *Fluidized bed reactors for the clean combustion and gasification of solid fuels,*
- ✓ *Sound assisted fluidization of cohesive powders particles*
- ✓ *Combustion and gasification mechanisms and kinetics of coals and other carbonaceous materials.*

The national and international visibility of Riccardo Chirone is provided by different scientific awards:

- ✓ Best Poster Award at the 1st International Congress “Advances in the Packaging Industry Product and Process, Naples Italy 19-20 Novembre (2015)
- ✓ Oscar Masi 2013 Award – 30 edition, to the Team of Tekne Fluff project (2014)
- ✓ Key-note lecture - Conf. Int. Fluidization XIV, Noordwijkerhout, Netherlands (2013)
- ✓ Best Paper Award: *An Assessment of Water and Steam Reactivation of a Fluidized Bed Spent Sorbent for Enhanced SO_2 Capture,* 6th Int. Symposium and Exhibition of Gas Cleaning at High Temperatures, Osaka, Japan (2005)
- ✓ Chairman of the 21st Int. Conference on Fluidized Bed Combustion, Italy (2012)

- ✓ Chairman of the 12th Int. Conference Multiphase Flow in Industrial Plants, Italy (2011)
- ✓ Chairman of the Colloquium: Solid Fuels, Waste Combustion and Gasification, del Sixth (2009) and of the Seventh Mediterranean Combustion Symposium, (2011)
- ✓ Chairman of the Workshop: Combustion Technologies for the Optimization of Production/Consumption Cycles, Italian Section of the Combustion Institute, Italy (2005)
- ✓ Chairman of Fluidization XI – Present and Future for Fluidization Engineering, Engineering Conference International, NY, USA, Italy (2004)
- ✓ Chairman of the Colloquium: Solid fuels and waste combustion, Third Mediterranean Combustion, Symposium, Marrakech, Morocco, (2003)
- ✓ Chairman of the Workshop: Attrition Phenomena in Fluidized Bed Combustion of Fossil/non-Fossil
- ✓ Fuels, 41st IEA-Fluidized Bed Conversion Meeting, Italy (2000)
- ✓ Plenary Lecture on Particle Comminution Phenomena in the Fluidized Bed Combustion of non- Fossil Fuels, Mediterranean Combustion Symposium '99: Turchia, (1999).
- ✓ Chairman of thed Colloquium: Solid Fuels, *XXVI Symposium (Int.) on Combustion*, Italy 1996
- ✓ Reviewer of several national and International research projects (INTAS – Int. Association for the Promotion of Cooperation with Scientists from the New Independent States; MIUR; CIVR; PRRIITT etc.)
- ✓ Member of reviewers' panel of international journals relevant to the fields of Chemical Engineering, of Combustion and of Powder Technology: Chem. Eng. Sci., Powder Technol., Combust. Sci. Technol., Combust. Flame, Prog. Energy Comb. Sci., AIChE J., of the Biennial Symposia on Combustion, of the Fluidization Conferences organized by the Engineering Foundation and of the Biennal Fluidized Bed Combustion Conferences organized by ASME

Selected Publications in ISI Journals in the last five years:

2019

Raganati, F., Alfe, M., Gargiulo, V., Chirone, R., Ammendola, P.:
Kinetic study and breakthrough analysis of the hybrid physical/chemical CO2 adsorption/desorption behavior of a magnetite-based sorbent,
Chemical Engineering Journal, 372, pp. 526-535

Raganati, F., Chirone, R., Ammendola, P.:
Preliminary study on sound assisted calcium looping for TCEs in CSP applications,
Chemical Engineering Transactions, 74, pp. 427-432

Ammendola, P., Raganati, F., Chirone, R., Miccio, F.:
Thermodynamic and kinetic characterization of yellow tuff for CO2 adsorption,
Chemical Engineering Transactions, 74, pp. 1207-1212

Cammarota, A., Cammarota, F., Chirone, R., (...), Solimene, R., Urciuolo, M.:
Fluidized Bed Combustion of Pelletized Sewage Sludge in a Pilot Scale Reactor,
Combustion Science and Technology, 191(9), pp. 1661-1676

Brachi, P., Chirone, R., Miccio, F., Miccio, M., Ruoppolo, G.:
Valorization of Orange Peel Residues via Fluidized Bed Torrefaction: Comparison between Different Bed Materials,
Combustion Science and Technology, 191(9), pp. 1585-1599

Senneca, O., Heuer, S., Bareschino, P., (...), Chirone, R., Scherer, V.:
Fragmentation of pulverized coal in a laminar drop tube reactor: Experiments and model,
Proceedings of the Combustion Institute, 37(3), pp. 2849-2855

Gargiulo, V., Alfè, M., Raganati, F., (...), Ammendola, P., Chirone, R:
CO2 Adsorption under Dynamic Conditions: An Overview on Rice Husk-Derived Sorbents and Other Materials,
Combustion Science and Technology
191(9), pp. 1484-1498

Brachi, P., Chirone, R., Miccio, M., Ruoppolo, G.:
Fluidized bed torrefaction of biomass pellets: A comparison between oxidative and inert atmosphere,

Powder Technology, Article in Press

Tregambi, C., Bevilacqua, C., Cammarota, A., (...), Picarelli, A., Magaldi, M.:
Experimental characterization of granular materials for directly irradiated fluidized bed solar receivers,
AIP Conference Proceedings
2126, 030060

Raganati, F., Chirone, R., Ammendola, P.:
Preliminary study on sound assisted calcium looping for TCEs in CSP applications,
Chemical Engineering Transactions
74, pp. 427-432

2018

Brachi, P., Chirone, R., Miccio, M., Ruoppolo, G.: Fluidized Bed Torrefaction of Commercial Wood Pellets: Process Performance and Solid Product Quality,
Energy and Fuels
32(9), pp. 9459-9469

Gargiulo, V., Alfè, M., Raganati, F., (...), Chirone, R., Ammendola, P.: BTC-based metal-organic frameworks: Correlation between relevant structural features and CO2 adsorption performances,
Fuel
222, pp. 319-326

Raganati, F., Alfe, M., Gargiulo, V., Chirone, R., Ammendola, P.: Isotherms and thermodynamics of CO2 adsorption on a novel carbon-magnetite composite sorbent,
Chemical Engineering Research and Design, 134, pp. 540-552

Brachi, P., Chirone, R., Miccio, F., Miccio, M., Ruoppolo, G.:
Entrained-flow gasification of torrefied tomato peels: Combining torrefaction experiments with chemical equilibrium modeling for gasification,
Fuel
220, pp. 744-753

Raganati, F., Chirone, R., Ammendola, P.:
Gas-solid fluidization of cohesive powders,
Chemical Engineering Research and Design
133, pp. 347-387

Urciuolo, M., Chirone, R., Saverio Marra, F., Solimene, R.:
Power generation by Stirling engine during fluidized bed combustion of wood pellets,
Combustion Science and Technology
Article in Press

Raganati, F., Scherillo, F., Squillace, A., Chirone, R., Ammendola, P.
Improvement of the Manufacturing Process of Tungsten Carbide-Cobalt Hard Metals by the Application of Sound Assisted Fluidization for the Mixing of the Powders
Industrial and Engineering Chemistry Research, 57 (1), pp. 414-424.

2017

Raganati, F., Chirone, R., Ammendola, P.Effect of Temperature on Fluidization of Geldart's Group A and C Powders: Role of Interparticle Forces
Industrial and Engineering Chemistry Research, 56 (44), pp. 12811-12821.

Ammendola, P., Raganati, F., Chirone, R.
CO2adsorption on a fine activated carbon in a sound assisted fluidized bed: Thermodynamics and kinetics
Chemical Engineering Journal, 322, pp. 302-313.

Senneca, O., Scala, F., Chirone, R., Salatino, P.Relevance of structure, fragmentation and reactivity of coal to combustion and oxy-combustion
Fuel, 201, pp. 65-80.

Migliozzi, S., Paulillo, A., Chirone, R., Salatino, P., Solimene, R. Hydrodynamics of compartmented fluidized beds under uneven fluidization conditions

Powder Technology, 316, pp. 476-491.

Solimene, R., Cammarota, A., Chirone, R., Leoni, P., Rossi, N., Salatino, P. Combustion of lignin-rich residues with coal in a pilot-scale bubbling fluidized bed reactor
Powder Technology, 316, pp. 718-724.

Miccio, F., Ruoppolo, G., Chirone, R.
Development of synthetic sorbents based on Ca oxide for CO2 capture in fluidized bed reactors
Advanced Science Letters, 23 (6), pp. 5841-5843.

Senneca, O., Bareschino, P., Urciuolo, M., Chirone, R.
Prediction of structure evolution and fragmentation phenomena during combustion of coal: Effects of heating rate
Fuel Processing Technology, 166, pp. 228-236.

Ammendola, P., Raganati, F., Chirone, R., Miccio, F.
Preliminary Assessment of Tuff as CO2 Sorbent
Energy Procedia, 114, pp. 46-52.

Brachi, P., Chirone, R., Miccio, F., Miccio, M., Ruoppolo, G. Segregation and fluidization behavior of poly-disperse mixtures of biomass and inert particles
Chemical Engineering Transactions, 57, pp. 811-816.

Brachi, P., Riianova, E., Miccio, M., Miccio, F., Ruoppolo, G., Chirone, R.
Valorization of sugar beet pulp via torrefaction with a focus on the effect of the preliminary extraction of pectins
Energy and Fuels, 31 (9), pp. 9595-9604.

2016

Viscusia A., P. Ammendola, A. Astarita, F. Raganati, F. Scherillo, A. Squillace, R. Chirone, L. Carrino
Aluminum foam made via a new method based on cold gas dynamic sprayed powders mixed through sound assisted fluidization technique,
Journal of Materials Processing Technology, Vol. 231, pp. 265–276.

Areepraserta C., F. Scala, A. Coppola, M. Urciuolo, R. Chirone, P. Chanyavanich, K. Yoshikawa
Fluidized bed co-combustion of hydrothermally treated paper sludge with two coals of different rank,
Fuel Processing Technology, Vol. 144, pp. 230–238.

Gargiulo V., M. Alfèa, P. Ammendola, F. Raganati, R. Chirone
CO2 sorption on surface-modified carbonaceous support: Probing the influence of the carbon black microporosity and surface polarity,
Applied Surface Science, Vol. 360, Part A, pp. 329–337.

2015

Raganati F., P. Ammendola, R. Chirone
Effect of acoustic field on CO2 desorption in a fluidized bed of fine activated carbon, Particuology, Vol. 23, pp. 8–15.

Raganati F., P. Ammendola, R. Chirone
CO2 Capture by Adsorption on Fine Activated Carbon in a Sound Assisted Fluidized Bed,
Chemical Engineering Transactions, Vol. 43, pp. 1033-1038.

Ruoppolo G., Miccio F., Brachi P., Picarelli A., Chirone R.
In situ carbon dioxide capture during biomass fluidized bed gasification,
Chemical Engineeri Transactions, Vol 43, pp. 775-780.

Rubino F., P. Ammendola, A. Astarita, F. Raganati, A. Squillace, A. Viscusi, R. Chirone, L. Carrino
An innovative method to produce metal foam using cold gas dynamic spray process assisted by fluidized bed mixing of precursors,
Key Engineering Materials, Vol. 651.653, pp. 913-918

Gargiulo V., Raganati F., Ammendola P., Alfe M., Chirone, R.
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Ammendola P., Raganati F., Chirone R.
Effect of operating conditions on the CO2 recovery from a fine activated carbon by means of TSA in a fluidized bed assisted by acoustic fields,
Fuel Processing Technology, Vol. 134, pp. 494–501.

Alfe M., Ammendola P., Gargiulo V., Raganati F., Chirone, R.
Assessment of magnetite/carbon composites capacity in CO2 adsorption under sound assisted fluidization conditions,
Chemical Engineering Transactions, Vol 43, pp. 1081-1086.

Salatino P., Ammendola P., Bareschino P., Chirone R., Solimene R.
Improving the thermal performance of fluidized beds for concentrated solar power and thermal energy storage,
Powder Technology, Vol. 290, pp. 97–101.

Alfe M., Ammendola P., Gargiulo V., Raganati F., Chirone R.
Magnetite loaded carbon fine particles as low-cost CO2 adsorbent in a sound assisted fluidized bed,
Proceedings of the Combustion Institute, Vol. 35, Issue 3, pp. 2801-2809.