

MAURIZIO MASI, MSc PhD
Professor in Applied Physical Chemistry - Politecnico di Milano (Italy)



A. Personal Information:

Place and date of Birth:
Marital Status :
Home Address :
Affiliation:
Phones :
emails :

B. Education:

<i>Diploma di Perito Chimico Industriale (High School), I.T.I.S. "T. Buzzzi" Prato (Italy) - 60/60</i>	<i>1979</i>
<i>Laurea (M.Sc.) in Chemical Engineering, Politecnico di Milano (Italy) - 100/100 cum laude</i>	<i>1985</i>
<i>Dottorato di Ricerca (Ph.D.) in Electrochemical Engineering, Politecnico di Milano (Italy)</i>	<i>1989</i>

C. Professional and Management Experiences:

Enichem Polimeri fellow, Politecnico di Milano	1985
Visiting Student, Università Autonoma Metropolitana Itzapalapa, (Mexico)	1987
Postdoctoral fellow, Politecnico di Milano	1989-90
Ricercatore (Assistant Professor) in <i>Chemical Engineering</i> , Politecnico di Milano	1990-98
Visiting Scientist, Massachusetts Institute of Technology, Cambridge MA (USA)	1991-92
Professore Supplente (Joint Professor) in <i>Chemical Engineering Unit Operations</i> , Università di Parma (Italy)	1995-03
Professore Associato (Associate Professor) in <i>Applied Physical Chemistry</i> , Politecnico di Milano	1998-02
Professore Ordinario (Full Professor) in <i>Applied Physical Chemistry</i> , Politecnico di Milano	2002-
President, Chemical Engineering Council, Politecnico di Milano	2005-09
Associated Editor, <i>Chemical Papers</i> , Springer	2007-13
Preside (Dean), Facoltà di ingegneria dei Processi Industriali, Politecnico di Milano	2010-12
Board, Academic Senate, Politecnico di Milano	2010-12
Board, CoPI, Italian Conference of Engineering Schools Deans	2011-12
Vice Secretary, USPUR, Union of University Professors and Researchers	2012-14
National Secretary, USPUR, Union of University Professors and Researchers	2015-
Direttore (Head), Dipartimento di Chimica, Materiali e Ingegneria Chimica "Giulio Natta", Politecnico di Milano	2013-19
Board, Copl, Italian Conference for Engineering	2013-19
Scientific Director, CEN, Centro Europeo di Nanomedicina, Milano	2013-18
President, GRICU, Chemical Engineering University Group	2020-
World Economic Forum Expert in Advanced Materials and Chemistry and Materials Industry	2020-

D. Consulting Activity:

Researches and consulting activities have been performed in cooperation with primary industrial groups as well with small and medium enterprises, whose number so far exceeds 70:

A2A, Milano; **Abbott**, Roma; **Alerion**, Milano; **Arthur D. Little**, Milano; **Associazione Conciatori**, Santa Croce sull'Arno; **Assomineraria**, Roma; **BCN Concerie**, Santa Croce sull'Arno; **Becromal**, Milano; **Bozzetto**, Filago; **BTSR International**, Olgiate Olona; **Caffaro-Snia**, Torviscosa; **Cardiocentro Ticino**, Lugano; **Carlo Gavazzi Space**, Milano; **CEA**, Milano; **Chiorino Technology**, Biella; **Cimbali**, Binasco; **CMA**, Susegana; **Condotte**, Roma; **COMAS**, Silea; **Consorzio Rilegno**, Milano; **Consorzio SGS**, Santa Croce sull'Arno; **DSM**, Geleen NL; **ECIR**, Pavia; **Enel CRA**, Milano; **Eni**, Milano; **ETC**, Catania; **Eurotecnica**, Milano; **Evonik**, Novara; **Fater**, Pescara; **Flow Meter**, Levate; **Fondazione Enrico Mattei**, Milano; **Fonderia Battaglia**, Milano; **Garbo Servizi**, Cerano; **Gimac**, Castronno; **Glaris**, Caronno Pertusella; **Golden Lady**, Castiglione

delle Stivere; **IBChem**, Brindisi; **Industria e Innovazione**, Milano; **Isoltech**, Verdellino; **Istituto dell'Autodisciplina Pubblicitaria**, Milano; **Johnson&Johnson**, Roma; **Kendeil**, Gallarate; **Lineapelle**, Milano; **LPE Epitaxial Technology**, Bollate; **Mazzucchelli1849**, Varese; **MEMC**, Novara; **Meliorbanca**, Milano; **Metalli Preziosi**, Paderno Dugnano; **MG Chemtex**, Tortona; **Microsphere**, Lugano; **Moncler**, Milano; **Morgan Electrical Carbon**, Martinsicuro; **NBS Morena Pelli**, Santa Croce sull'Arno; **NeoDecorTech**, Filago; **Novaceta**, Magenta; **Novachem**, Milano; **OCMI-OTC**, Milano; **Pirelli Cavi e Sistemi**, Milano; **PlasticFinder**, Milano; **Polioli**, Milano; **Porto Carlo Riva**, Rapallo; **Prophos**, S.Giovanni in Croce; **Provincia di Bolzano**, **Prysmian**, Milano; **Consorzio Remedia**, Milano; **Puglia Sviluppo**, Modugno; **RePlegel**, Torino; **Silbemi**, Milano; **Sidel**, Parma; **Snamprogetti**, Milano; **SOL**, Pioltello; **Solarventures**, Milano; **Stahl**, Paderno Dugnano; **ST Microelectronics**, Grenoble; **Tecnoforniture**, Milano; **T&P**, Tradate; **Trenord**, Milano; **TRM**, Torino; **TognanaSuperroof**, Treviso; **UNIC**, Milano; **VeneziaTecnologie**, Venezia; **Wave**, Milano.

E. Main Research Interest Keywords:

- **Chemical Kinetics and Chemical Reaction Engineering** (*development of complex chemical mechanisms, gas-liquid reactors, aerosol reactors, bioreactors, not traditional heterogeneous reactors*)
- **Microelectronics Materials & Advanced Inorganic Materials Processing** (*thermal and plasma assisted Chemical Vapor Deposition processes, Crystal Growth processes, aerosol systems*)
- **Biomedical Engineering** (*cells and tissue growth in scaffold supporting media, biopolymers for controlled drug delivery, design of controlled drug delivery systems*)
- **Transport Phenomena** (*diffusional processes in complex systems and media, processes with action of external field*)
- **Process development in circular economy** (*chemical recycle of polymers, substitution of polymers, metals recovery from electronic wastes by hydrometallurgy, solar modules recycle, general industrial wastes recovery and secondary uses*)
- **Electrochemically enhanced chemical processes** (*leather tanning, chemical processes decarbonization*)
- **Food Engineering** (*industrialization of food recipes, processing of sparkling drinks*)

Author of more than 150 scientific papers on international journals, besides numerous presentation at conferences (several invited) and four books: "Esercitazioni di termodinamica dell'ingegneria chimica" and "Termodinamica Chimica Applicata" authored with R. Rota, "Silicon Epitaxy" edited with D. Crippa and D.L. Rode, "Controlled Drug Delivery Systems - Towards New Frontiers in Patient Care" authored with F. Rossi and G. Perale).

F. Main Funded Projects in competitive source of fundings:

Maurizio Masi has been the local unit principal investigator or the project coordinator of the following projects:

- **Reattori ad alta potenzialita' per produzione di celle solari a larga area (6-8" di diametro) basate sull'eterosistema Ge/GaAs/GaInP**. ASI Italian Space Agency. National project coordinator. Partners POLIMI, CNR-MASPEC, CESI. Overall funding 2561 MLIT (1.3 Meuro). Years 2000-04
- **E-WASTE – il ciclo intelligente**. Smart Cities & Community Regione Lombardia. Local unit principal investigator. Partners POLIMI, Comune di Milano, Comune di San Donato Milanese, AMSA, Consorzio REMEDIA, Stena Metall, Gaser, Tecnochimica, CEFRIEL. Local unit funding CMIC 0.35 Meuro. Years 2003-05
- **Produzione di celle fotovoltaiche a basso costo mediante tecnologie di stampa in pressione**. PRI Regione Lombardia e MIUR. Local unit principal investigator. Partners SILBEMI, POLIMI, ERREDIESSE. Local unit funding 0.105 Meuro. Years 2014-15
- **Power Semiconductor and Electronics Manufacturing 4.0**. ECSEL-IA. Local unit principal investigator. 34 EU partners. Local unit funding 0.255 Meuro. Years 2016-18 <http://www.semi40.eu/>
- **PHOSave – Innovative solution for phosphate recovery from exhausted extinguishing powders**, SMEInstr-11- 2016. Local unit principal investigator. Partners Prophos, POLIMI. Local unit funding 0.173 Meuro. Years 2016-18 <https://cordis.europa.eu/project/id/724586/it>

- **Foodtech - Prodotti innovativi in campo ZooTecnico.** POR Lombardia 2014-20. Local unit principal investigator. Partners Prophos, POLIMI, UNICATT, UNIMI, Ferraroni, BiotecnologieBT. Local unit funding 0.742 Meuro. Years 2017-19 <https://www.openinnovation.regione.lombardia.it/it/b/30638/progetto-foodtech>
- **3-routes platform for REcovery of high Value products, ENergy and bio-fertilizer from Urban biowaste (REVENUE).** Fondazione CARIPLO 2019. National project coordinator. Partners POLIMI, UNICAMPUS, CNR. Overall funding 0.294 Meuro. Years 2020-21 <https://www.revenueproject.eu/home/>

G. Bibliometric Parameters @ December 2021:

Database:	Scopus
Scopus indexed publications:	144
Sum of the Times Cited:	2257
Average Citations per Article:	15.67
h-index:	26

H. Teaching Activities:

"Processes and Chemical Unit Operations II", Università di Parma, School of Science, College of Industrial Chemistry, 5th year 1995-01

"Technology Fundamentals", Politecnico di Milano, School of Architecture, College of Architecture, 1st year 1994-98

"Materials Engineering", Politecnico di Milano, School of Engineering, College of Civil Engineering, 3rd year 1998

"Physical Chemistry of Electronic Materials", Politecnico di Milano, School of Engineering, College of Chemical Engineering, 5th year 1999-04

"Thermodynamics for Chemical Engineers", Politecnico di Milano, School of Engineering, College of Chemical Engineering, 3rd year 1997-08

"Applied Chemical Kinetics", Politecnico di Milano, School of Engineering, College of Chemical Engineering, 3rd year 1999

"Bulk Materials Processing" Politecnico di Milano, School of Engineering, College of Chemical Engineering, 5th year 2005-07

"Electrochemical Energy Generators", Politecnico di Milano, School of Industrial and Information Engineering, College of Chemical Engineering, 2nd year MSc level 2003-21

"Thin Solid Films Processing", Politecnico di Milano, School of Industrial and Information Engineering, College of Chemical Engineering, 2nd year MSc level 2005-13

"Fluid Mechanics", Politecnico di Milano, School of Industrial and Information Engineering, College of Materials Engineering and Nanotechnology 2012-18

"Principle of Food Manufacturing", Politecnico di Milano, School of Industrial and Information Engineering, College of Food Engineering 2019-21

"Chemical Engineering Principles", School of Industrial and Information Engineering, College of Chemical Engineering 2021-

"Sustainable Management of Industrial Processes", School of Industrial and Information Engineering, College of Food Engineering 2022-

I. Services to the Country

Ministero Industria e Sviluppo Economico, progetto Italia 2030, Coordinator of the working table "Innovazione per l'economia circolare: materiali e digitale" 2020

Ministero dell'Università e della Ricerca, Piano Nazionale di Ricerca 2021-2027, coordinator of the working table "green technologies" 2020

Commissione Innovazione e Sviluppo dell'Accademia dei Lincei, member

2019-



Selected Publications:

1988-1990

- M. Masi, M. Sangalli, S. Carrà, G. Cao, M. Morbidelli, "Kinetics of Ethylene Hydrogenation on Supported Platinum - Analysis of Multiplicity and Nonuniformly Active Catalyst Particle Behavior", *Chemical Engineering Science*, **43**, pp. 1849-1854, (1988).
- G. Storti, M. Masi, R. Paludetto, M. Morbidelli, S. Carrà, "Adsorption separation processes: Countercurrent and simulated countercurrent operations", *Computers & Chemical Engineering*, **12**, Issue 5, pp. 475-482, (1988).
- G. Storti, M. Masi, S. Carrà and M. Morbidelli, "Modeling and Design of Simulated Moving-bed Adsorption Separation Units", *Preparative Chromatography*, **1**, pp. 1-28, (1988).
- G. Storti, M. Masi, S. Carrà, M. Morbidelli, "Optimal design of multicomponent countercurrent adsorption separation processes involving nonlinear equilibria", *Chemical Engineering Science*, **44**, pp. 1329-1345, (1989).
- S. Carrà, M. Masi, M. Morbidelli, "Fundamentals of Convection in Melt Growth", *Journal of Crystal Growth*, **97**, pp. 1-8, (1989).
- M. Masi, S. Carrà, M. Morbidelli and V. Scaravaggi, F. Preti, "Monodimensional Model of Cold Wall Reactors for Epitaxial Silicon Chemical Vapor Deposition", *Chemical Engineering Science*, **45**, pp. 3551-3561, (1990).

1991-1995

- M. Masi, H. Simka, K.F. Jensen, T.F. Kuech, R. Potemski, "Simulation of Carbon Doping of GaAs during MOVPE", *Journal of Crystal Growth*, **124**, pp. 483-492, (1992).
- H. Simka, M. Masi, T.P. Merchant, K.F. Jensen, T.F. Kuech, "Mechanism of Carbon Incorporation in OMCVD of GaAs and Related Compounds", in *Chemical Vapor Deposition XII*, K.F. Jensen and G.W. Cullen (Eds), The Electrochemical Society, Pennington NJ, ISBN 1-56677-074-2, pp. 205-213, (1993).
- M. Masi, G. Besana, L. Canzi, S. Carrà, "Modeling of Silicon Nitride Deposition by RF Plasma Enhanced Chemical Vapor Deposition", *Chemical Engineering Science*, **49** (5), pp. 669-679, (1994).
- S. Fogliani, M. Masi, S. Carrà, G. Guadalupi, B. Smith, L. Meregalli, "Thermal Analysis of Liquid-encapsulated Czochralski-grown InP Crystals", *Material Science & Engineering*, **B28**, pp. 72-75, (1994).
- S. Fogliani, M. Masi, S. Carrà, B. Molinas, G. Guadalupi, L. Meregalli, "Thermal stresses and dislocation formation in liquid-encapsulated Czochralski-grown InP crystals", *Material Science & Engineering*, **B28**, pp. 76-79, (1994).
- M. Masi, S. Fogliani, S. Carrà, "Simulation of Epitaxial Silicon Chemical Vapor Deposition in Barrel Reactors", *Journal de Physique IV*, **5Pr5**, pp. 261-268 (1995).

1996-2000

- S. Carrà, S. Fogliani, M. Masi, L. Zanotti, C. Mucchino, C. Paorici, "Melt-solid Interface Shape in L.E.C. GaAs Crystals: Comparison between Calculated and experimentally Observed Shapes", *Journal of Crystal Growth*, **166**, pp. 641-645 (1996).
- M. Masi, R. Zonca, S. Carrà, "Estimation of the Dopant Effect on the Surface Kinetics in CVD Systems through the Charge-transfer Theory", in *Chemical Vapor Deposition XIII*, T.M. Besmann, M.D. Allendorf, McD. Robinson, R.K. Ulrich (Eds), The Electrochemical Society, Pennington NJ, ISBN 1-56677-155-2, pp. 47-52, (1996).
- M. Masi, S. Fogliani, S. Carrà, "Modeling and Optimization of Barrel Reactors for Epitaxial Silicon CVD", in *Chemical Vapor Deposition XIII*, T.M. Besmann, M.D. Allendorf, McD. Robinson, R.K. Ulrich (Eds), The Electrochemical Society, Pennington NJ, ISBN 1-56677-155-2, pp. 125-130, (1996).
- M. Masi, D. Colella, G. Radaelli, L. Bertolini, "Simulation of chloride penetration in cement-based materials", *Cement and Concrete Research*, **27**, pp. 1591-1601, (1997).
- M. Masi, C. Cavallotti, S. Carrà, "Simulation of diamond-like carbon deposition in PECVD reactors", in *Chemical Vapor Deposition XIV*, M.D. Allendorf, C. Bernard (Eds), The Electrochemical Society, Pennington NJ, ISBN 1-56677-178-1, pp. 278-285, (1997).
- M. Masi, S. Carrà, G. Vaccari, D. Crippa, "Optimization of SiO₂ atmospheric deposition in continuous belt systems", in *Chemical Vapor Deposition XIV*, M.D. Allendorf, C. Bernard (Eds), The Electrochemical Society, Pennington NJ, ISBN 1-56677-178-1, pp. 1167-1174, (1997).
- R. Fornari, E. Gilioli, G. Mignoni, M. Masi, "A study of convection, striations and interface shape in InP crystals grown by the double-crucible LEC technique", *Crystal Research Technology*, **32**, pp. 1085-1093, (1997).
- M. Masi, C. Cavallotti, G. Radaelli, S. Carrà, "Kinetics of indium phosphide epitaxial growth using metal organic precursors", *Crystal Research Technology*, **32**, pp. 1125-1136, (1997).
- S. Carrà, M. Masi, "Kinetic Approach to material synthesis by gas phase deposition", *Progress in Crystal Growth and Characterization of Materials*, **37**, pp. 1-46 (1998).
- C. Cavallotti, M. Masi, S. Carrà, "Modeling plasma-assisted deposition of diamond-like carbon films", *Journal of the Electrochemical Society*, **142**, pp. 4332-4341 (1998).
- C. Cavallotti, C. Medeossi, C. Turconi, M. Masi, S. Carrà, "A kinetic model for the MOCVD of CdTe", in *Fundamental gas-phase and surface chemistry of vapor phase materials synthesis*, M.D. Allendorf, M.R. Zachariah, L. Mountziaris, A.H. McDaniel (Eds), The Electrochemical Society, Pennington NJ, ISBN 1-56677-217-6, pp. 46-51, (1998).
- M. Masi, C. Cavallotti, G. Radaelli, S. Carrà, "Detailed kinetics modeling of indium phosphide films in MOCVD reactors", in *Thin Films for Photovoltaics*, E.D. Jones, J. Kalejs, R. Noufi, B. Sopori (Eds.), Material Research Society, Warrendale PA, ISBN 1-55899-390-8, pp. 229-324, (1998).
- M. Masi, G. Radaelli, N. Roda, P. Raimondi, S. Carrà, G. Vaccari, D. Crippa, "Towards the optimization of AMT barrel reactors for silicon epitaxy", in *Semiconductor Processes and Device Performance Modeling*, S.T. Dunham, J.S. Nelsoni (Eds.), Material Research Society, Warrendale PA, ISBN 1-55899-395-9, pp. 187-192, (1998).

- M. Masi, C. Cavallotti, S. Carrà, "Different approaches for methane plasma modeling", *Chemical Engineering Science*, **53**, pp. 3875-3886 (1998).
- M. Masi, R. Zonca, S. Carrà, "Kinetic modeling and dopant effect on silicon deposition: low pressure and plasma assisted chemical vapor deposition", *Journal of the Electrochemical Society*, **146**, pp. 103-110 (1999).
- C. Cavallotti, V. Bertani, M. Masi, S. Carrà, "A kinetic model for metallorganic chemical vapor deposition of CdTe", *Journal of the Electrochemical Society*, **146**, pp. 3277-3284 (1999).
- M. Masi, C. Cavallotti, S. Carrà, "Gas phase and surface kinetics of diamond-like carbon films growth in PECVD reactors", in *Properties and Processing of Vapor-Deposited Coatings*, R.N. Johnson, W.Y Lee, M.A. Pickering, B. W. Sheldon (Eds), Material Research Society, Warrendale PA, ISBN 1-55899-461-0, pp. 321-326, (1999).
- M. Masi, S. Fogliani, S. Carrà, "Sensitivity analysis on indium phosphide liquid encapsulated Czochralski growth", *Crystal Research Technology*, **34**, pp. 1157-1167 (1999).
- C. Cavallotti, M. Masi, N. Lovergine, P. Prete, A.M. Mancini, S. Carrà, "A density functional theory study of surface and gas phase processes occurring during the MOCVD of ZnS", *Journal de Physique IV*, 9Pr8, pp. 33-40 (1999).
- A.M. Rinaldi, S. Carrà, M. Rampoldi, M.C. Martignoni, M. Masi, "LPCVD vertical furnace optimization for undoped polysilicon film deposition", *Journal de Physique IV*, 9Pr8, pp. 189-196 (1999).
- C. Cavallotti, M. Masi, S. Carrà, "A statistical thermodynamic approach to model plasma reactors", *Journal de Physique IV*, 9Pr8, pp. 197-204 (1999).
- M. Masi, C. Cavallotti, F. Di Muzio, S. Carrà, D. Crippa, G. Vaccari, "2D and 1D modeling of AMT barrel reactors for silicon deposition", *Journal de Physique IV*, 9Pr8, pp. 273-280, (1999).
- D. Colella, D. Vinci, R. Bagatin, M. Masi, E. Abu Bakr, "A study on coalescence and breakage mechanisms in three different bubble columns", *Chemical engineering Science*, **54**, pp. 4767-4777 (1999).
- P. Pelegatti, A. Bacchi, M. Carcelli, M. Costa, A. Fochi, P. Ghidini, E. Leporati, M. Masi, C. Pelizzi, G. Pelizzi, "Palladium(II) complexes containing a P,N chelating ligand. Part III: influence of the basicity of tridentate hydrazonic ligands on the hydrogenating activity of unsaturated C-C bonds", *Journal of Organometallic Chemistry*, **583**, pp. 94-105 (1999).
- M. Masi, V. Bertani, C. Cavallotti, S. Carrà, "Epitaxial silicon growth between Scylla and Charybdis", *Chemical Vapor Deposition*, **6**, pp. 206-214, (2000).
- M. Masi, S. Carrà, M. Polli, M. Ratti, G. Guadalupi, "Transient dynamics and control of indium phosphide LEC furnaces", *Materials Chemistry and Physics*, **66**, pp. 236-245 (2000).
- F. Di Muzio, M. Masi, S. Carrà, "Modeling of aerosol deposition of titania thin films", *Materials Chemistry and Physics*, **66**, pp. 286-293 (2000).
- G. Attolini, S. Carrà, F. Di Muzio, R. Fornari, M. Masi, C. Pelosi, "A vertical reactor for deposition of gallium nitride", *Materials Chemistry and Physics*, **66**, pp. 213-218 (2000).
- V. Bertani, C. Cavallotti, M. Masi, S. Carrà, "Density Functional Study of the Interaction of Palladium Clusters with Hydrogen and CH_x Species", *Journal of Physical Chemistry A*, **104**, pp. 11390-11397, (2000)

2001-2005

- G. Valente, C. Cavallotti, M. Masi, S. Carrà, "Reduced order model for the CVD of epitaxial silicon from silane and chlorosilanes", *Journal of Crystal Growth*, **230**, pp. 247-257 (2001).
- M. Masi, "Multiscale approach to material synthesis by gas phase deposition", *Journal de Physique IV*, 11Pr3, pp. 117-128 (2001).
- M. Masi, C. Cavallotti, S. Carrà, "Gas phase and surface kinetics of silicon chemical vapor deposition from silane and chlorosilanes", *Silicon-Based Materials and Devices*, H. S. Nalwa (editor), Academic Press, San Diego CA, ISBN: 0-12-513909-8, vol. 1, chapter 4, pp. 155-186, (2001).
- M. Masi, S. Carrà, "Reactor design and process simulations for silicon vapor epitaxy", *Encyclopedia of Materials: Science and Technology*, Elsevier Science, Oxford UK, ISBN: 0-08-0431256, chapter 6.6.36, pp. 8687-8593 (2001).
- M. Masi and S. Kommu, "Epitaxial Reactor Modeling", in *Silicon Epitaxy*, Eds. D. Crippa, M. Masi, D.L. Rode, Academic Press, San Diego CA, ISBN: 0-12-752181-x, chapter 6, pp. 185-224 (2001).
- C. Cavallotti and M. Masi, "Epitaxial Growth Theory: Vapor Phase and Surface Chemistry", in *Silicon Epitaxy*, Eds. D. Crippa, M. Masi, D.L. Rode, Academic Press, San Diego CA, ISBN: 0-12-752181-x, Chapter 2, pp. 51-88 (2001).
- M. Di Stanislao, G. Valente, S. Fascella, C. Spampinato, S. Carrà, M. Masi, "Multi-model hierarchy approach to simulate barrel reactors for epitaxial silicon deposition", *Journal de Physique IV*, 12Pr4, pp. 121-128 (2001).
- M. Polli, M. Di Stanislao, R. Bagatin, E. Abu Bakr, M. Masi, "Bubble size distribution in the sparger region of bubble columns", *Chemical Engineering Science*, **57**, pp. 197-205 (2002).
- D. Moscatelli, C. Cavallotti, M. Masi, S. Carrà, "A quantum chemistry investigation of the gas phase and surface chemistry of the MOCVD of ZnSe", *Journal of Crystal Growth*, **248**, pp. 31-36 (2003).
- V. Bertani, C. Cavallotti, M. Masi, S. Carrà, "A theoretical analysis of the molecular events involved in hydrocarbons reactivity on palladium clusters", *Journal of Molecular Catalysis A*, **204-205**, pp. 771-778 (2003).
- M. Masi, M. Di Stanislao, A. Veneroni, "Fluid-dynamics during vapor epitaxy and modeling", *Progress in Crystal Growth and Characterization of Materials*, **77**, pp. 239-270 (2003).
- M. Rondanini, C. Cavallotti, D. Moscatelli, M. Masi, S. Carrà, "A combined fluid dynamics and 3D kinetic monte carlo investigation of the selective deposition of GaAs and InP", *Journal of Crystal Growth*, **272**, pp. 52-58 (2004).
- C. Cavallotti, D. Moscatelli, M. Masi, S. Carrà, "Accelerated decomposition of gas phase metal organic molecules determined by radical reactions", *Journal of Crystal Growth*, **266**, pp. 363-370 (2004).
- M. Masi, "Crescita cristallina da fase vapore", *Enciclopedia del Novecento*, supplemento III, volume A-G, pp. 277-287, Istituto dell'Enciclopedia Italiana, Roma (2004).

- A. Veneroni, D. Moscatelli, M. Masi, "Modeling of large scale horizontal reactor for silicon epitaxy", *Journal of Crystal Growth*, **275**, pp. e289-e293 (2005).
- A. Veneroni, F. Omarini, D. Moscatelli, M. Masi, S. Leone, M. Muaceri, G. Pistone, G. Abbondanza, "Modeling of epitaxial silicon carbide deposition", *Journal of Crystal Growth*, **275**, pp. e295-e300 (2005).
- A. Veneroni, F. Omarini, M. Masi, "Silicon carbide growth mechanism from SiH₄, SiHCl₃ and nC₃H₈", *Crystal Research Technology*, **40**, pp. 967-971 (2005).

2006-2010

- F. La Via, G. Galvagno, F. Roccaforte, F. Giannazzo, S. Di Franco, A. Ruggiero, R. Reitano, L. Calcagno, G. Foti, M. Mauceri, S. Leone, G. Pistone, F. Portuese, G. Abbondanza, G. Abbagnale, A. Veneroni, F. Omarini, L. Zamolo, M. Masi, G.L. Valente, D. Crippa, "High growth rate process in a SiC horizontal CVD reactor using HCl", *Microelectronic Engineering*, **83**, pp. 48-50 (2006).
- C. Pelosi, G. Attolini, M. Bosi, D. Moscatelli, A. Veneroni, M. Masi, "A new MOVPE reactor for heteroepitaxial GaAs deposition on large-scale Ge substrates", *Journal of Crystal Growth*, **287**, pp. 652-655 (2006).
- A. Veneroni, M. Masi, "Gas-Phase and Surface Kinetics of Epitaxial Silicon Carbide Growth Involving Chlorine-Containing Species", *Chemical Vapor Deposition*, **12**, pp. 562-568 (2006).
- F. La Via, G. Galvagno, G. Foti, M. Mauceri, S. Leone, G. Pistone, G. Abbondanza, A. Veneroni, M. Masi, G. L. Valente, D. Crippa, "4H SiC Epitaxial Growth with Chlorine Addition", *Chemical Vapor Deposition*, **12**, pp. 509-515 (2006).
- A. Fiorucci, D. Moscatelli, M. Masi, "p-doping mechanism in HTCVD silicon carbide", *Journal of Crystal Growth*, **303**, pp. 349-351 (2007).
- A. Fiorucci, D. Moscatelli, M. Masi, "Mechanism of n-doping of silicon carbide epitaxial films", *Journal of Crystal Growth*, **303**, pp. 345-348 (2007).
- V. Busini, P. Arosio, M. Masi, "Mechanistic modelling of avascular tumor growth and pharmacokinetics influence—Part I", *Chemical Engineering Science*, **62**, pp. 1877-1886 (2007).
- A. Fiorucci, D. Moscatelli, M. Masi, "Homoepitaxial silicon carbide deposition processes via chlorine routes", *Surface & Coatings Technology*, **201**, pp. 8825-8829 (2007).
- A. Veneroni, M. Masi, "Reduced Gas Phase and Surface Kinetics for Silicon Carbide Epitaxial Growth", *ECS Transactions*, **2**, pp. 11-20 (2007).
- G. Perale, G. Pertici, C. Giordano, F. Daniele, M. Masi, S. Maccagnan, "Nondegradative Microextrusion of Resorbable Polyesters for Pharmaceutical and Biomedical Applications: The Cases of Poly-Lactic-Acid and Poly-Caprolactone", *Journal of Applied Polymer Science*, **108**, pp. 1591-1595 (2008).
- G. Perale, C. Giordano, F. Daniele, M. Masi, "A Novel Process for the Manufacture of Ceramic Microelectrodes for Biomedical Applications", *International Journal of Applied Ceramic Technology*, **5**, pp. 37-43 (2008).
- G. Perale, C. Giordano, F. Daniele, M. Tunesi, P. Colombo, L. Gottardo, S. Maccagnan, M. Masi, "Extruded ceramic microelectrodes for biomedical applications", *The International Journal of Artificial Organs*, **31**, pp. 272-278 (2008).
- G. Perale, F. Bianco, C. Giordano, M. Matteoli, M. Masi, A. Cigada, "Engineering injured spinal cord with bone marrow-derived stem cells and hydrogel-based matrices: a glance at the state of the art", *Journal of Applied Biomaterials & Biomechanics*, **6**, pp. 1-8 (2008).
- P. Arosio, V. Busini, G. Perale, D. Moscatelli, M. Masi, "A new model of resorbable device degradation and drug release - part I: zero order model", *Polymer International*, **57**, pp.912-920 (2008).
- G. Perale, P. Arosio, D. Moscatelli, V. Barri, M. Müller, S. Maccagnan, M. Masi, "A new model of resorbable device degradation and drug release: Transient 1-dimension diffusional model", *Journal of Controlled Release*, **136**, pp. 196-205 (2009).
- G. Manenti, M. Masi, "Numerical investigation on new configurations for vapor-phase aerosol reactors", *Chemical Engineering Science*, **64**, pp.3525-3535 (2009).
- D. Moscatelli, M. Dossi, A. Fiorucci, M. Masi, "A density functional theory study of chlorosilanes polymerization in silicon epitaxy", *ECS Transactions*, **25**, pp.33-40 (2009).
- M. Masi, A. Fiorucci, M. Camarda, A. La Magna, F. La Via, "Multiscale simulation for epitaxial silicon carbide growth by chlorides route", *Thin Solid Films*, **518**, pp. S6-S11 (2010).
- F. Rossi F, G. Perale G, M. Masi, "Biological buffered saline solution as solvent in agar-carbomer hydrogel synthesis", *Chemical Papers*, **64**, pp. 573-578 (2010).
- G. Perale, T. Casalini, V. Barri, M. Muller, S. Maccagnan, M. Masi, "Lidocaine Release from Polycaprolactone Threads", *Journal of Applied Polymer Science*, **117**, pp. 3610-3614 (2010).

2011-2015

- G. Perale, F. Rossi, E. Sundstrom, S. Bacchiega, M. Masi, G. Forloni, P. Veglianese, "Hydrogels in Spinal Cord Injury Repair Strategies", *ACS Chemical Neuroscience*, **2**, pp. 336-345 (2011).
- G. Manenti, M. Masi, "Simulation study of production of fine ceramic powders in a cyclone reactor", *Chemical Engineering and Processing*, **50**, pp. 151-159 (2011).
- M. Masi, C. Cavallotti, E. Raffa, "Modeling of flame assisted chemical vapor deposition of silicon films", *Crystal Research Technology*, **46**, pp. 865 - 870 (2011).
- G. Perale, C. Giordano, F. Bianco, F. Rossi, M. Tunesi, F. Daniele, F. Crivelli, M. Matteoli, M. Masi, "Hydrogel for cell housing in the brain and in the spinal cord", *International Journal of Artificial Organs*, **34**, pp. 295-303 (2011).
- F. Rossi, M. Santoro, T. Casalini, P. Veglianese, M. Masi, G. Perale, "Characterization and Degradation Behavior of Agar-Carbomer Based Hydrogels for Drug Delivery Applications: Solute Effect", *International Journal of Molecular Sciences*, **12**, pp. 3394-3408 (2011).

- G. Perale, F. Rossi, M. Santoro, P. Marchetti, A. Mele, F. Castiglione, E. Raffa, M. Masi, "Drug Release from Hydrogel: A New Understanding of Transport Phenomena", *Journal of Biomedical Nanotechnology*, **7**, pp. 1–6 (2011).
- M. Santoro, P. Marchetti, F. Rossi, G. Perale, F. Castiglione, A. Mele, M. Masi, "Smart Approach To Evaluate Drug Diffusivity in Injectable Agar-Carbomer Hydrogels for Drug Delivery", *Journal of Physical Chemistry B*, **115**, pp. 2503–2510 (2011).
- G. Perale, P. Veglianese, F. Rossi, M. Peviani, M. Santoro, D. Llupi, E. Micotti, G. Forloni, M. Masi, "In situ agar-carbomer hydrogel polycondensation: A chemical approach to regenerative medicine", *Materials Letters*, **65**, pp. 1688–1692 (2011).
- T. Casalini, M. Salvalaglio, G. Perale, M. Masi, C. Cavallotti, "Diffusion and Aggregation of Sodium Fluorescein in Aqueous Solutions", *Journal of Physical Chemistry B*, **115**, pp. 12896–12904 (2011).
- C. Cavallotti, M. Masi, "Kinetics of SiHCl₃ Chemical Vapor Deposition and Fluid Dynamic Simulations", *Journal Of Nanoscience and Nanotechnology*, **11**, pp. 8054-8060, (2011).
- F. Rossi, G. Perale, G. Storti, M. Masi, "A Library of Tunable Agarose Carbomer-Based Hydrogels for Tissue Engineering Applications: The Role of Cross-Linkers", *Journal of Applied Polymer Science*, **123**, pp. 2211–2221 (2012).
- G. Perale, F. Rossi, P. Veglianese, M. Masi, "Chemical engineering approach to regenerative medicine", *Chemical Papers*, **66**, pp. 108-119 (2012).
- G. Perale, F. Rossi, M. Santoro, M. Peviani, S. Papa, D. Llupi, P. Torriani, E. Micotti, S. Previdi, L. Cervo, E. Sundström, A.R. Boccaccini, M. Masi, G. Forloni, P. Veglianese, "Multiple drug delivery hydrogel system for spinal cord injury repair strategies", *Journal of Controlled Release*, **159** pp. 271–280 (2012).
- T. Casalini, M. Masi, G. Perale, "Drug eluting sutures: A model for in vivo estimations", *International Journal of Pharmaceutics*, **429**, pp. 148– 157 (2012).
- F. Rossi, T. Casalini, E. Raffa, M. Masi, G. Perale, "Bioresorbable Polymer Coated Drug Eluting Stent: A Model Study", *Molecular Pharmaceutics*, **9**, pp. 1898–1910, (2012).
- F. Rossi, P. Veglianese, M. Santoro, S. Papa, C. Rogora, V. Dell'Oro, G. Forloni, M. Masi, G. Perale, "Sustained Delivery of Chondroitinase ABC from Hydrogel System", *Journal of Functional Biomaterials*, **3**, pp. 199-208, (2012).
- F. Manenti, M. Masi, G. Santucci, G. Manenti, "Parametric simulation and economic assessment of a heat integrated geothermal desalination plant", *Desalination*, **317**, pp. 193–205, (2013).
- S. Ravasio, M. Masi, C. Cavallotti, "Analysis of the Gas Phase Reactivity of Chlorosilanes", *Journal Of Physical Chemistry A*, **117**, pp. 5221-5231, (2013).
- C. Cavallotti, F. Rossi, S. Ravasio, M. Masi, "A Kinetic Analysis of the Growth and Doping Kinetics of the SiC Chemical Vapor Deposition Process", *Industrial & Engineering Chemistry Research*, **53**, pp. 9076-9087, (2014).
- M. Masi, C. Cavallotti, D. Boccacari, F. Castellana, "Preliminary design of a novel high throughput CVD reactor for photovoltaic applications", *Crystal Research And Technology*, **49**, pp. 614-619 (2014).
- T. Casalini, F. Rossi, S. Lazzari, G. Perale, M. Masi, "Mathematical Modeling of PLGA Microparticles: From Polymer Degradation to Drug Release", *Molecular Pharmaceutics*, **11**, pp. 4036-4048, (2014).
- A. Sacchetti, E. Mauri, M. Sani, M. Masi, F. Rossi, "Microwave-assisted synthesis and click chemistry as simple and efficient strategy for RGD functionalized hydrogels", *Tetrahedron Letters*, **55**, pp. 6817-6820, (2014).
- F. Rossi, F. Castiglione, M. Ferro, P. Marchini, E. Mauri, M. Moioli, A. Mele, M. Masi, "Drug-Polymer Interactions in Hydrogel-based Drug-Delivery Systems: An Experimental and Theoretical Study", *Chem.Phys.Chem.*, **16**, pp. 2818-2825, (2015).

2016-2020

- F. Rossi, F. Castiglione, M. Ferro, M. Moioli, A. Mele, M. Masi, "The Role of Drug-Drug Interactions in Hydrogel Delivery Systems: Experimental and Model Study", *Chem.Phys.Chem.*, **17**, pp. 1615-1622, (2016).
- E. Mauri, I. Moroni, L. Magagnin, M. Masi, A. Sacchetti, F. Rossi, "Comparison between two different click strategies to synthesize fluorescent nanogels for therapeutic applications", *Reactive & Functional Polymers*, **105**, pp. 35-44, (2016).
- E. Mauri, S. Papa, M. Masi, P. Veglianese, F. Rossi, "Novel functionalization strategies to improve drug delivery from polymers", *Expert opinion on drug delivery*, pp. 1-9, (2017)
- F. Bisotti, F. Licordari, F. Rossi, M. Masi, "In Silico Study of Polymer Sheet Drying Process", *International Polymer Processing*, **32**, pp. 474-482 (2017)
- F. Rossi, F. Castiglione, M. Salvalaglio, M. Ferro, M. Moioli, E. Mauri, M. Masi, A. Mele, "On the parallelism between the mechanisms behind chromatography and drug delivery: the role of interactions with a stationary phase", *Chem.Phys.Chem.*, **19**, pp. 11518-11528, (2017).
- E. Mauri, A. Negri, E. Rebellato, M. Masi, G. Perale, F. Rossi, "Hydrogel-Nanoparticles Composite System for Controlled Drug Delivery", *Gels*, **4**, pp. 1-12 (2018)
- E. Mauri, F. Cappella, M. Masi, F. Rossi, "PEGylation influences drug delivery from nanogels", *Journal Of Drug Delivery Science and Technology*, **46**, pp. 87-92 (2018)
- E. Mauri, D. Naso, A. Rossetti, E. Borghi, E. Ottaviano, G. Griffini, M. Masi, A. Sacchetti, F. Rossi, "Design of polymer-based antimicrobial hydrogels through physico-chemical transition", *Materials Science & Engineering C-Materials for Biological Applications*, **103**, art. 109791 (2019).
- F. Rossi, M. Masi, "On the ability of chromatographic mass balance to predict solute diffusivity in drug delivery systems", *AIChE Journal*, **65**, art. UNSP e16709 (2019)
- F. Pizzetti, V.M.A. Granata, U. Riva, F. Rossi, M. Masi, "A mathematical model of a slurry reactor for the direct synthesis of hydrogen peroxide", *Reaction Chemistry & Engineering*, **4**, pp. 2117-2128 (2019)

- E. Mauri, M. Masi, "Nanomaterials for spinal cord injury (SCI) regeneration", Chapter 8 in "Spinal Cord Injury (SCI) Repair Strategies", G. Perale, F. Rossi (Eds.), Woodhead Publishing, pp. 129-155, ISBN 9780081028070 (2020)

2021-

- F. Pinellia, F. Pizzetti, A. Rossetti, Z. Poselb, M. Masi, A. Sacchetti, P. Posocco, F. Rossi, "Effect of surface decoration on properties and drug release ability of nanogels", *Colloids and Surfaces A: Physicochemical and Engineering Aspects*, **614**, pp.126164, (2021).
- C. Atzeni, G. Lesma, G. Dubini, M. Masi, F. Rossi, E. Bianchi, "Computational fluid dynamic models as tools to predict aerosol distribution in tracheobronchial airways", *Nature Research: Scientific Reports*, **11**, pp. 1109 (2021).

• Patents:

- F. Codignola, D. Gelosa, M. Masi, S. Carrà, "Process for the production of aliphatic polyols" IT1274690, July 24, 1997
- G. Valente, V. Pozzetti, O. Kordina, M. Masi, N. Speciale, D. Crippa, F. Preti, "System for growing silicon carbide crystals", US2006283389, priority IT2003MI01196, June 13 (2003).
- M. Masi, "Process for the preparation of carbamates of primary and secondary polyamines", EP1756045, priority MI2004A001229, June 18, 2004.
- S. Leone, M. Mauceri, G. Abbondanza, D. Crippa, G. Valente, M. Masi, F. Preti, "Cleaning process and operating process for a CVD reactor", US2007264807, priority IT2004MI01677, August 30, 2004.
- M. Masi, "Method and reactor for growing crystals", EP1907609, priority MI2005A001308, July 11, 2005
- M. Masi, D. Moscatelli, G. Fragiaco, "Processo per il recupero del silicio dalle sospensioni abrasive di taglio esauste o dai loro addensati", priority RM2008A000216, April 22, 2008
- F. Daniele, C. Giordano, M. Masi, G. Perale, F. Rossi, "Idrogel idoneo a contenere e veicolare cellule neuronali", priority MI2008A001000, May 29, 2008
- F. Daniele, C. Giordano, M. Masi, G. Perale, F. Rossi, M. Tunesi, "Idrogel idoneo a contenere e veicolare cellule", priority MI2008A002037, November 17, 2008
- M. Masi, D. Moscatelli, M.P. Bogana, "Processo di attivazione di film di tellururo di cadmio per tecnologie fotovoltaiche", priority MI2008A001949, November 5, 2008
- F. Daniele, C. Giordano, M. Masi, G. Perale, F. Rossi, M. Tunesi, "Hydrogel capable of containing and conveying cells", WO2009/144569, priority MI2008A001000, May 29, 2008
- F. Caporale, F. Di Fonzo, M. Di Stanislao, M. Masi, M. Tonini, "Cella fotovoltaica, in particolare per applicazioni architettoniche integrate, e metodo di fabbricazione di tale cella", priority MI2010A014316, June 14, 2010
- M. Masi, L. Magagnin, P.P. Costa, L. Costa, "Metodo per il condizionamento di scorie derivate da smaltimento di impianti nucleari", priority MI2012A000801, May 10, 2012
- M. Masi, L. Magagnin, P.P. Costa, L. Costa, "Metodo per il condizionamento di scorie derivate da smaltimento di impianti nucleari", priority MI2012A000803, May 10, 2012
- M. Masi, L. Magagnin, P.P. Costa, L. Costa, "Metodo per il condizionamento di scorie derivate da smaltimento di impianti nucleari", priority MI2012A000817, May 10, 2012
- M. Masi, G. Santucci, F. Manenti, "Impianto per lo sfruttamento dell'energia geotermica", priority MI20121030, June 13, 2012
- M. Masi, G. Santucci, F. Manenti, "Uso dell'energia geotermica per la desalinizzazione dell'acqua marina", priority MI20121028, June 13, 2012
- M. Masi, L. Magagnin, P.P. Costa, P.L. Costa, "Method for the conditioning of waste arising from the decommissioning of nuclear plants", WO2013/168118 A2, priority MI2012A000801, May 10, 2012
- F. Caporale, F. Di Fonzo, M. Di Stanislao, M. Masi, M. Tonini, "Method for manufacturing a photovoltaic cell for integrated building applications", EP2559070 A1, priority IT2010MI00614, April 12, 2010
- D. Moscatelli Davide, M. Masi, R.M. Pesce, "Amphiphilic magnetic nanoparticles and aggregates to remove hydrocarbons and metal ions and synthesis thereof", WO2015177710 A1, priority IT2014MI00913, May 20, 2014.
- M. Zaltieri, N. Grassi, M. Masi, F. Rossi, "Modified polyester having antibacterial properties and use of the modified polyester", WO2018154403A1, priority IT102017000019556, February 21, 2017.
- M. Masi, L. Magagnin, F. Rossi, E. Gibertini, G. Rovere, "Chromium enhanced tanning process", EP3527675 A1, priority IT20180002822, February 19, 2018.
- Masi M., Rossi F., Di Stanislao M., "Reattore per la cattura di elementi o composti chimici da una prima miscela liquida e per il loro rilascio in una seconda miscela liquida", priority IT201900001425, July 31, 2020
- F. Manenti, M. Masi, S. Miele, E. Bargiacchi, "Impianto per la produzione di syngas a partire da polimeri plastici di recupero pretrattati", priority IT201900013239, January 29, 2021



- **Reports of political and social relevance**

- M. Masi, S. Carrà, "Le energie rinnovabili", in "Le fonti di energia" S. Carrà (Ed.), Collana Prismi, Il Mulino, Bologna ISBN: 978-88-15-12415-9 (2008)
- G.-F. Bassani, M. Bianucci, S. Carrà, L. Cifarelli, E. De Sanctis, G. Mariotti, M. Masi, P. Menna, S. Monti, A. Renieri, R. A. Ricci, G. Ricco, U. Romano, E. Ronchi, G. Rostagni, G. Silvestrini, W. Tocci, "Energy in Italy: Problems and perspectives (1990-2020)", *Il Nuovo Cimento B*, 124, pp. 1009-1159 (2009)
- M. Masi, "Università, tecnologie, imprese", in "Strutture industriali e innovazione sistemica" M. Fortis and A. Quadrio Curzio (Eds.), Collana Fondazione Edison, Il Mulino, Bologna ISBN: 978-88-15-27839-5 (2018)
- N. Aste, M. Bocciolone, D. Bogdanov, E. Brost, C. Breyer, V. Burrows, C. C. Ambel, E. Colombo, C. Del Pero, T. Earl, M. Hafner, F. Leonforte, M. Masi, R. Mazzoncini, M. Noussan, "Roadmap to 2050: A Manual for Nations to Decarbonize by Mid-Century", P. Carnevale and J. D. Sachs (eds), FEEM Fondazione Eni Enrico Mattei and SDSN Sustainable Development Solutions Network, pp. 1-144, (2019).
- M. Masi and G. V. Vilè, "Chemical and Materials Industry", World Economic Forum Strategic Intelligence, (2020), <https://intelligence.weforum.org/topics/a1Gb0000000pTDfEAM?tab=publications>
- M. Masi, E. Oddo, M.C. Rulli, J.E.A. Seabra, C.S. Goh, P. D'Odorico, J. Dell'Angelo, N. Galli, L.A. Horta Nogueira, T. Richard, M. Santini, "Roadmap to 2050: The Land-Water-Energy Nexus of Biofuels", E. Crete and G. Crisci (eds), FEEM Fondazione Eni Enrico Mattei and SDSN Sustainable Development Solutions Network, pp. 1-164, (2021).