

CURRICULUM VITAE – Dr. Roberto COPPOLA

Personal Information

Birth date: [REDACTED]
Birth place: [REDACTED]
Nationality: [REDACTED]
Home Address: [REDACTED]
Phone: [REDACTED]

Current professional position:

- *in-kind scientific ENEA consultant, in charge of contributing in the completion of several research activities regarding nuclear materials for fusion and fission technology*
- *in-kind scientific consultant to CREATE, in charge of contributing to DTT and EUROfusion WPDIV Projects.*

Education

1976

Master degree in physics (“laurea di dottore in fisica”) *cum laude* at the University of Roma “La Sapienza”, discussing an experimental thesis on magneto-optic effects in YIG’s

Work Experience

1977

Aid assistant at the University of Ancona, Italy – fundamental research in solid state physics, assistance to teaching and examining

1978-1980

Euratom fellowship at the Institut Max von Laue – Paul Langevin, Grenoble, France – development of neutron scattering techniques to characterize nuclear steels within the “Nuclear Safety Programme” of the JRC-Ispra; development of neutron monochromators.

1981-1982

Temporary Foreign Coworker at CEA-Commissariat à l’Energie Atomique, Metallurgy Department, Grenoble, France – characterization of super-alloys for fast breeder reactor by means on neutron scattering techniques; development of software for neutron data analysis.

1983 - 2020

Employed as an expert in neutron diffraction at the ENEA-Agenzia Nazionale per le Nuove Tecnologie, l’Energia e lo Sviluppo Economico Sostenibile, research center “Casaccia”, Roma, Italy.

He is responsible for experimental activities carried out in the frame of the ENEA research programs on

development of materials for fission, fusion and renewable energies. These activities are carried out both on national commitments and in the frame of European research programs, utilizing international neutron sources and coordinating internal manpower support, as well as collaborations with external laboratories and some industries. He assists the management in the definition of strategies for access to irradiation facilities and for participation in international programs.

Scientific activity

His experimental work consists primarily in the characterization of technical materials and components by means of neutron techniques, such as neutron diffraction and small-angle neutron scattering (SANS). As shown by the attached list of scientific publications, the studies he has until now coordinated have provided the following main results:

- characterizing by SANS the micro-structural radiation damage in nuclear steels, under a variety of irradiation conditions, and providing fundamental information on damage mechanisms, not obtainable by other experimental methods
- developing the utilization of polarized SANS in the characterization of magnetic steels and alloys for deeper understanding of micro-structural evolution
- developing SANS data analysis methods to obtain reliable metallurgical information
- validating numerical evaluations of stress distributions in nuclear welds by means of non-destructive neutron diffraction measurements
- applying neutron diffraction measurements to the quantitative characterization of industrial fuel-cell prototypes.

Administrative responsibilities

He has been and currently is responsible for the ENEA of agreements for the industrial utilization of neutron beam-time, concluded with the following laboratories:

Laboratoire Léon-Brillouin, CEA	1988 – 1998
Institut Max von Laue – Paul Langevin	1998 – 2013
Helmholtz Zentrum Berlin	2013
Heinz Maier-Leibnitz Zentrum	since 2014, active
Oak Ridge National Laboratory	active
National Institute for Standards and Technology	active.

He has been responsible for the ENEA of research contracts concluded with the following Italian Universities:

Università di Ancona/Politecnica delle Marche	1987-2000 and 2010-2012
Università di Roma-Tor Vergata	1987-1994.

Formal commitments

Scientific responsible for ENEA of the ENEA-JRC Agreement for the joint utilization of the Ispra Cyclotron (1987-1992)

ENEA delegate in the “Expert Group Structural Materials for NET” within the Fusion Programme (1987-1993)

ENEA delegate in the “Post-Irradiation Examinations (PIE) Group” within the MEGAPIE Project (2000-2005)

Member of the ENEA internal consultancy group “Gruppo Ristretto Sorgente di Spallazione” (2000-2005)

ENEA contact person for SP4 Modelling Project in the frame of European Energy Research Alliance – Joint Programme on Nuclear Materials EERA-JPNM (2010-2014)

ENEA delegate at IAEA Technical Meeting “Catalogue of Products and Services of Research Reactors: Applications of Neutron Beams” – Vienna 5-9/9/2011

ENEA delegate at IAEA Technical Meeting “Advanced Materials for Energy Storage and Conversion” – Vienna 24-28/9/2012

Responsible of RESTRESS Pilot Project in the frame of European Energy Research Alliance – Joint Program on Nuclear Materials EERA-JPNM (2014-2016)

Internal ENEA coordinator of activities carried out in the frame of the EUROfusion WPMAT Project (2020)

Participation in funded projects

Since 1990, he has been responsible for the ENEA of several tasks in the frame of the Fusion Programme (ITER, EFDA, Underlying Technology). He is currently principal investigator for the following EUROfusion tasks

ENR-PRD.MAT.IREMEV.5-T005-D001 – SANS study of radiation damage in Eurofer steel

MAT-2.2.3-T005-D002 – SANS and neutron diffraction qualification of advanced steels

MAT-2.2.3-T005-D003 – SANS study of HFIR irradiated advanced steels

DIV-2.1.7-T004-D001 – stress field experimental validation in W/Cu joints for divertor

and participates in ENR-MFE19.01-SCK-CEN-01-PREDICT – radiation damage in W.

Participation in fission materials programs:

SP4 EERA-JPNM – Modeling of irradiation induced hardening and creep in F/M alloys (2010-2015)

SP2 EERA-JPNM – Characterization of ODS alloys (2010-2015)

H2020 Generation IV Materials Maturity Project (GEMMA) – stress distributions in nuclear welds (2016-2021)

He has participated in the following IAEA Collaborative Research Projects:

CRP Id 15723 - *Investigation of Innovative Materials for MCFC and SOFC by Means of Neutron Diffraction and SANS* (2009-2012)

CRP Id 1186 - *Benchmarking of structural materials pre-selected for advanced nuclear reactors* (2010-2013)

CRP Id 1575 - *Development, Characterization and Testing of Materials of Relevance to Nuclear Energy Sector Using Neutron Beams* (2011-2014)

Main participations in national funded projects:

MURST-Agglomerato SDR (Italian Ministry for Research) – development of innovative SANS multi-detectors (1999- 2001)

Project 09A05805, CERSE MISE (Italian Ministry for Economic Development) – neutron study of materials for innovative fuel cells, in collaboration with Ansaldo FC and SOFCPower (2009-2011)

PAR2011 –ENEA–L1C1 MISE (Italian Ministry for Economic Development) – neutron studies of nuclear materials (2010-2012)

Recent seminars

Neutron diffraction studies of electrodes for innovative fuel cells of industrial interest, within the frame of Joint ICTP-IAEA Advanced School on the “Role of Nuclear Technology in Hydrogen Based Energy Systems”, Trieste, June 2011.

Application of small-angle neutron scattering (SANS) in the microstructural investigation of irradiated nuclear steels, within the frame of Joint ICTP-IAEA Workshop on “Non-adiabatic Dynamics and Radiation Damage in Nuclear Materials”, Trieste, November 2011.

SANS and neutron diffraction studies of materials and components for nuclear applications, International Workshop on “Industrial research using synchrotron and neutron methods” Berlin, December 2013.

Industrial Research at ENEA, CRISP European Workshop on Imaging with Neutrons, Grenoble, March 2014.

SANS and neutron diffraction studies of materials for energy applications, HZB Industry Workshop, Berlin, February 2015.

Experimental needs for neutron scattering methods in the investigation of advanced engineering materials, CREMLIN Workshop “Demands of European neutron users in materials science for the instrumentation of the upcoming PIK neutron science centre”, Kiel, September 2016

SANS and neutron diffraction studies of fusion reactor materials and components, International Workshop “Neutron Sciences in Support of Nuclear Power 2019”, Oak Ridge National Laboratory, May 2019.

Recent oral presentations at conferences

Neutron diffraction study of NiO/LiCoO₂ electrodes for innovative fuel cell development, MRS Spring Meeting – Symposium W, San Francisco, USA, April 2010

Optimisation of SANS data analysis for modeling microstructural radiation damage in nuclear steels, International Small-Angle Scattering Conference SAS2012, Sydney, Australia, November 2012

Advanced materials research in nuclear energy sector using research reactors and particle accelerators American Nuclear Society Winter Meeting, San Diego, USA, November 2012

Defect Distributions in Irradiated Nuclear Steels as Investigated with Complementary TEM and Small-Angle Neutron Scattering, Electron Microscopy & Multiscale Modeling EMMM2013 Conference, Kyoto, Japan, November 2013

Comparative SANS investigation of 9 Cr and of AISI304 Oxide Dispersion Strengthened (ODS) steels for nuclear applications, International Small-Angle Scattering Conference SAS2015, Berlin, September 2015

Experimental Investigation Of High He/dpa Microstructural Effects In Neutron Irradiated B-alloyed Eurofer97 Steel By Means Of Small Angle Neutron Scattering (SANS) And Electron Microscopy, International Conference on Fusion Reactor Materials ICFRM17, Aachen, Germany, October 2015

Radiation damage studies in fusion reactor steels by means of small-angle neutron scattering (SANS), International Conference on Neutron Scattering ICNS2017, Daejeon, South Korea, July 2017

SANS and neutron diffraction studies of fusion reactor materials and components, American Conference of Neutron Scattering ACNS2018, University of Maryland, USA, June 2018

Neutron diffraction measurement of residual stresses in an ITER-like tungsten-monoblock type plasma-facing component, 30th Symposium on Fusion Technology SOFT2018, Taormina, Italy, September 2018

Reproducibility and reliability in SANS measurements of irradiated steels for the future fusion reactors, canSASXI Workshop, Freising, Germany, July 2019

Experimental needs for neutron scattering methods in the characterization of nuclear materials and components, Efficient Neutron Sources ENS Workshop, Villigen, Switzerland, September 2019.

Participation in scientific events

Scientific Secretary of The International School of Physics “E. Fermi” Course CXIV *Industrial and Technological Applications of Neutrons*, Lerici, Italy June 1990; co-editor of the Proceedings (North-Holland, 1992)

Member of the Organizing Committee of the ENEA-Associazione Italiana di Metallurgia Symposium *Ricerca, sviluppo e tecnologie dei materiali per reattori a fusione*, Frascati, Italy, December 1990

Member of the Organizing Committee of the International Conference on Fusion Reactor Materials ICFRM6, Stresa, Italy, October 1993

Co-organizer of the ENEA-Associazione Italiana di Metallurgia Symposium *Idrogeno e metalli*, Milano, Italy, May 1993

Invited participant at European Science Foundation Workshop *Scientific prospects for neutron Scattering with Present and Future Sources*, Autrans, France, January 1996

Member of the Program Committee of the International Conference on Fusion Reactor Materials ICFRM17, Aachen, Germany, October 2015

Co-organizer of Symposium *Materials challenges in thermo-nuclear fusion reactor research*, in the frame of NanoInnovation 2020 Conference, Roma, Italy, September 2020.

Others

Reviewer for the following Journals: *Metals* (review board member), *Fusion Engineering and Design*, *Nuclear Materials and Energy* (review board member), *Journal of Nuclear Materials*, *Journal of Applied Crystallography*

Guest Editor of *Metals* Special Issue *Radiation Damage of Metals and Alloys*, to be published in 2021

Appointed as Science Reviewer by ORNL Neutron Science Directorate to evaluate the 2018 SNS and HFIR SANS proposals

Professional practice of English and French (C2 understanding, speaking, writing)

List of scientific publications

- 1) A. Boeuf, R. Coppola, S. Melone, P. Puliti, F. Rustichelli, *Preliminary theoretical approach to the neutron diffraction by bent mosaic crystals*, Lett. Nuovo Cim. 26, 5 (1979) 129-134
- 2) A. Boeuf, R. Coppola, J. P. Morlevat, F. Rustichelli, D. Wenger, F. Zambonardi, *Time dependence at 600°C and 650°C of the $M_{23}C_6$ precipitation in AISI 304 Stainless Steel*, J. Mat. Sci. 16 (1981) 1975 -1979
- 3) A. Boeuf, R. Coppola, F. Rustichelli, F. Zambonardi, S. Melone, S. Maggi, P. Puliti, *Small angle neutron scattering investigation of the $M_{23}C_6$ precipitation in AISI 304 Stainless Steel*, J. Appl. Cryst. 14 (1981) 337-344
- 4) A. Boeuf, R. Coppola, F. Rustichelli, F. Zambonardi, S. Melone, P. Puliti, *Small-angle neutron scattering investigation of the creep damage in AISI 304 stainless steel*, Proc. Int. Conf. on “Mechanical behavior and nuclear applications of stainless steels”, Varese, 20-22 May 1981, book 280, The Met. Society (1982) p. 94-98
- 5) A. Boeuf, R. Coppola, R. Matera, P. Puliti, S. Melone, F. Rustichelli, F. Zambonardi, *Small-angle neutron scattering study of the damage induced by creep deformation in AISI 304 stainless steel*, Techn. Note EURATOM EUR 7821 EN (1982)
- 6) A. Mathiot, R. Coppola, *Etude de la précipitation de la phase γ' dans l'alliage 800 par diffusion des neutrons aux petits angles*, Report C. R. DMG/CEA 29/82
- 7) A. Boeuf, R. Caciuffo, R. Coppola, S. Crico, S. Melone, P. Puliti, R. Rebonato, F. Rustichelli, *Study of the $M_{23}C_6$ precipitation at 500°C and 700°C in AISI 304 by small-angle neutron scattering*, J. Nucl. Mat. 126 (1984) 276-284
- 8) A. Boeuf, R. Caciuffo, R. Coppola, S. Melone, P. Puliti, F. Rustichelli, *Study of the $M_{23}C_6$ precipitation in AISI 304 by small-angle neutron scattering*, Nucl. Inst. & Meth A234 (1985) 562-565
- 9) A. Mathiot, G. Robert, R. Coppola, S. Re Fiorentin, *Durcissement de l'alliage 800 par précipitation γ'* , Proc. 7th ICSMA, Montréal Aug. 1985, H. J. Mc Queen et al. Ed.s, Pergamon Press (1986) Vol. 1, p. 405-410
- 10) R. Coppola, S. Re Fiorentin, *Small-angle neutron scattering study of the γ' -phase precipitation in alloy 800*, PhysicaB 136 (1986) 465-468

- 11) S. Abis, R. Caciuffo, R. Coppola, M. Magnani, F. Rustichelli, M. Stefanon, *Small-angle neutron scattering study of the ageing process in Al-Mg-Si alloy*, Physica B 136 (1986) 469-472
- 12) S. Abis, R. Coppola, R. Ragazzini, *Fatigue crack propagation in an Aluminium AA5356 alloy*, J. Electr. Micr. 35 (1986) 1589-1590
- 13) S. Abis, R. Coppola, M. Stefanon, *Effect of spinodal decomposition on the precipitation of the Mg₂Al₃ phase in an Al-Mg 10% at alloy*, J. Electr. Micr. 35 (1986) 1613-1614
- 14) S. Abis, R. Caciuffo, R. Coppola, P. Fiorini, M. Magnani, F. Rustichelli, M. Stefanon, *Small-angle neutron scattering investigation on Mg₂Si precipitates in a single crystal of an Al-Mg-Si alloy*, Mat. Sc. Forum 13-14 (1987) 295-300
- 15) S. Abis, R. Caciuffo, R. Coppola, M. Stefanon, F. Rustichelli, *Recent applications of small-angle neutron scattering to the study of structural materials*, Mat. Sc. Forum 27/28 (1987) 421 -428
- 16) R. Coppola, S. Re Fiorentin, *Study of the γ' -precipitation kinetics in alloy 800 at 575°C by small-angle neutron scattering*, Nucl. Inst. & Meth. B22 (1987) 564 572
- 17) S. Abis, A. Du Pasquier, M. Stefanon, R. Coppola, *La spettroscopia positronica e la diffusione dei neutroni ai piccoli angoli come nuove tecniche non distruttive di indagine dei metalli*, La Metallurgia Italiana, 2/87, 123 – 131
- 18) S. Abis, R. Caciuffo, R. Coppola, *Neutron diffraction study of deformation textures in 7012 Aluminium alloy extruded bars*, Mat. Lett. 6 (1988) 423 - 426
- 19) R. Caciuffo, R. Coppola, I. Ray, F. Rustichelli, *Investigation of He-bubbles growth in α -implanted 1.4914 steel*, J. Nuc. Mat. 155-157 (1988) 916 - 920
- 20) R. Coppola, P. Gondi, R. Montanari, F. Veniali, *Structure evolution during heat treatments of 12% martensitic steel for NET*, J. Nuc. Mat. 155-157 (1988) 616 - 619
- 21) R. Coppola, *ENEA research programme on fusion reactor materials*, Proc. IAEA Int. Symp. on Multipurpose Research Reactors, Grenoble Oct. 1987, IAEA-SM-300/46 (Vienna, 1988) p.173 -180
- 22) S. Abis, R. Caciuffo, F. Carsughi, R. Coppola, R. K. Heenan, R. Osborn, M. Stefanon, *A small-angle neutron scattering study of the δ' -AlLi₃ coarsening in an AlLi alloy*, Physica B, 156-157 (1989) 68 - 71

- 23) R. Coppola, S. Omarini, G. Albertini, R. Caciuffo, F. Rustichelli, *Study of α -radiation damage in a steel for fusion technology*, N. Inst. & Meth. A280 (1989) 583-588
- 24) B. Brunelli, R. Coppola, P. Gondi, F. Rustichelli, *Use of X-ray and neutron scattering techniques in the characterization of advanced materials for fusion reactor technology*, Proc. AIM-ASTM Conf. on "Evolution of Advanced Materials", Milano May 1989, p. 483-489
- 25) S. Abis, R. Caciuffo, F. Carsughi, R. Coppola, M. Magnani, F. Rustichelli, M. Stefanon, *A study on the late stages of δ' -precipitation in an Al-Li alloy by small-angle neutron scattering*, Phys. Rev. B42 (1990) 2275-2281
- 26) R. Coppola, *Neutron sources for fusion reactor materials irradiation and 'diagnostics'*, Energianucleare 7 (1990) 77-83
- 27) G. Mercurio, P. Fenici, R. Coppola, O. Francescangeli, *Camera per impiantazione di ioni leggeri ad alta temperatura*, Atti del Simposio ENEA-AIM "Ricerca, sviluppo e tecnologie dei materiali per reattori a fusione", Frascati Dec. 1990, (1991) p.387-389
- 28) L. Brunelli, P. Gondi, R. Montanari, R. Coppola, *Internal strains and recovery of hardness in tempered martensitic steels for fusion technology*, J. Nuc. Mat. 179-181 (1991) 675-678
- 29) G. Albertini, F. Carsughi, R. Coppola, F. Rustichelli, W. Vlak, C. van Dijk, *Microstructural investigation of 12% Cr martensitic steel for NET by means of small-angle neutron scattering*, J. Nuc. Mat. 179-181 (1991) 706-708
- 30) G. Albertini, F. Carsughi, R. Coppola, D. D'Angelo, *Materials for Energy production plants*, Proc. Int. School of Physics "E. Fermi", Course CXIV "Industrial and Technological Applications of Neutrons", Lerici Jun. 1990, M. Fontana, F. Rustichelli and R. Coppola Ed.s, North Holland (1992) p. 145-165
- 31) G. Albertini, R. Coppola, A. Lodini, M. Perrin, F. Rustichelli, *Neutron measurements of residual strains in some technological materials and components*, Proc. NATO Workshop "Measurements of residual and applied stresses using neutron diffraction", Oxford March 1991, M. T. Hutchings and A. D. Krawitz Ed.s, NATO ASI Series vol. 610, Kluwer Ac. Publ. (1992) p. 525-534
- 32) P. Gondi, R. Montanari, R. Coppola, *Cr distribution effects and swelling resistance of MANET steel*, Mat. Sc. Forum 97-99 (1992) 387-392

- 33) G. Albertini, R. Coppola, *Small-angle neutron scattering studies of irradiated metallic materials*, N. Inst. & Meth. A314 (1992) 352-365
- 34) G. Albertini, F. Carsughi, R. Coppola, D. Schwahn, F. Rustichelli, G. Mercurio, *Small-angle neutron scattering study of microstructural inhomogeneities in a steel for fusion technology*, N. Inst. & Meth. A314 (1992) 381 - 384
- 35) P. Gondi, R. Montanari, R. Coppola, *On the statistical distribution of Cr atoms in Cr-Fe alloys with high swelling resistance in NFR*, J. Nuc. Mat. 191-194 (1992) 1274 -1278
- 36) G. Albertini, F. Carsughi, R. Coppola, W. Kesternich, F. Rustichelli, G. Mercurio, D. Schwahn, H. Ullmaier, *Study of He-bubble growth in MANET steel by means of small-angle neutron scattering*, J. Nuc. Mat. 191-194 (1992) 1327 - 1330
- 37) G. Albertini, M. Ceretti, R. Coppola, R. Jakeman, A. Lodini, P. Mariani, R. Matera, M. Perrin, F. Rustichelli, G. Vieider, *Neutron diffraction evaluation of internal stresses in first-wall components*, Fus. Techn. (1992) 147 – 150, C. Ferro *et al.* Ed.s, 1993 Elsevier Sc. Publ.
- 38) C. Capotorto, R. Coppola, P. Gondi, R. Montanari, M. E. Tata, *Tempering structures and related ductile-to-brittle transition in MANET steel*, Fus. Techn. (1993) 1311 - 1313
- 39) R. Coppola, *Ricerche di spettroscopia neutronica presso il CRE-Casaccia riguardo lo studio di materiali di interesse tecnologico*, Notiziario Neutroni, 2/3 (1992) 14 -16
- 40) R. Coppola, *Recenti applicazioni delle tecniche neutroniche in metallurgia fisica*, Energianucleare, (1993) 63 -76
- 41) G. Albertini, R. Coppola, F. Rustichelli, *Advanced applications of diagnostics techniques to fusion reactor materials*, Phys. Rep. 233 3 (1993) 137-193
- 42) R. Coppola, P. Gondi, R. Montanari, *Effects of C-Cr elementary aggregates on the properties of MANET steel*, J. Nuc. Mat. 206 (1993) 360-362
- 43) G. Albertini, F. Carsughi, M. Ceretti, R. Coppola, F. Fiori, A. Möslang, F. Rustichelli, *SANS study of irradiated MANET steel*, J. de Ph. C8 (1993) 283-286
- 44) G. Albertini, M. Ceretti, R. Coppola, S. Ghia, A. Lodini, P. Mariani, M. Perrin, F. Rustichelli, *Map of residual strain in a welded AISI304 steel component obtained by neutron diffraction*, Met. Sc. Tech. 11 1 (1993) 18-24

- 45) M. Ceretti, R. Coppola, E. Di Pietro, A. Lodini, M. Perrin, A. Piant, F. Rustichelli, *Neutron diffraction study of internal stresses in brazed CFC/Mo divertor structures for NET/ITER*, J. Nuc. Mat. 212-215 (1994) 1617-1620
- 46) P. Gondi, R. Montanari, A. Sili, R. Coppola, *Solute Cr atom distribution and fracture behaviour of MANET steel*, J. Nuc. Mat. 212-215 (1994) 564-568
- 47) G. Albertini, F. Carsughi, R. Coppola, F. Rustichelli, *Neutron techniques in the study of materials for fusion reactors*, Plasma Dev. and Op. 3 (1994) 293-305
- 48) C. Braham, M. Ceretti, R. Coppola, A. Lodini, F. Rustichelli, S. Tosto, *Neutron diffraction study of residual strains across electron-beam welds in AISI 316L stainless steel*, Fus. Tech. 30 (1995) 415 – 418, K. Herschbach *et al.* Ed.s, 1995 Elsevier Sc. Publ.
- 49) A. Donato, G. F. Moreschi, M. L. Apicella, S. Casadio, R. Coppola, A. Mignone, C. A. Nannetti, E. Scafé, *Compatibility of SiC/SiC fiber composite with Lithium oxide in fusion relevant conditions: materials characterization*, Fus. Tech. 30 (1995) 1305 – 1308
- 50) R. Coppola, P. Lukàs, R. Montanari, F. Rustichelli, M. Vràna, *X-ray and neutron diffraction line broadening measurements in a martensitic steel for fusion reactor technology*, Mat. Lett. 22 (1995) 17 - 21
- 51) G. Albertini, M. Ceretti, R. Coppola, F. Fiori, P. Gondi, R. Montanari, *Small-angle neutron scattering study of C-Cr elementary aggregates in a steel for fusion reactor technology*, Physica B 213-214 (1995) 812 -814
- 52) H. G. Brokmeier, R. Coppola, R. Montanari, F. Rustichelli, *Neutron diffraction study of the crystalline texture in a steel for fusion reactor technology*, Physica B 213-214 (1995) 809 – 811
- 53) M. Ceretti, R. Coppola, A. Lodini, M. Perrin, F. Rustichelli, *High resolution neutron diffractometer for internal stress measurements*, Physica B 213-214 (1995) 803 – 805
- 54) A. J. Allen, R. Coppola, M. T. Hutchings, M. Valli, C. G. Windsor, *Study of residual in a ferritic steel electron-beam test weldment using neutron diffraction*, Mat. Lett. 23 (1995) 265-268
- 55) R. Coppola, P. Fenici, F. Rustichelli, *Neutron scattering studies of α -radiation damage in steels*, The Mat. Chall. Bull., Oct 1995, p. 12-13

- 56) G. Albertini, F. Carsughi, M. Ceretti, R. Coppola, F. Rustichelli, M. Stefanon, *Radiation damage studies using small-angle neutron scattering*, ASTM Special Technical Publication, 1270 (1996) 206 -219
- 57) G. Albertini, F. Carsughi, R. Coppola, F. Fiori, A. Möslang, F. Rustichelli, *Small angle neutron scattering (SANS) investigation of irradiated MANET steel*, Appl. Radiat. Isot. Vol. 46, No 6/7 (1995) 729-730
- 58) R. Coppola, *Application aux composants pour la fusion thermonucléaire*, in “Analyse des contraintes résiduelle par diffraction des rayons X et des neutrons”, A. Lodini & M. Perrin Ed.s CEA ISBN 2-7272-0182-6 (1996) p. 269 - 276
- 59) G. Albertini, F. Carsughi, R. Coppola, F. Fiori, F. Rustichelli, M. Stefanon, *Small-angle neutron scattering microstructural investigation of MANET steel*, J. Nuc. Mat. 233-237 (1996) 253 - 257
- 60) G. Albertini, M. Ceretti, R. Coppola, A. Lodini, E. Di Pietro, *Neutron diffraction study of internal stresses in brazed divertor structures for ITER*, J. Nuc. Mat. 233-237 (1996) 954 - 958
- 61) R. Coppola, F. Fiori, M. Magnani, M. Stefanon, *Microstructural characterization of technological materials using small-angle neutron scattering*, J. App. Cryst. 30 (1997) 607 - 612
- 62) S. Caccavale, R. Coppola, A. Menelle, M. Montecchi, P. Polato, G. Principi, *Characterization of SnO_x films on architectural glass by neutron reflectometry, SIMS, CEMS and spectrophotometry*, J. Non Cryst. Sol. 218 (1997) 291 - 295
- 63) M. Ceretti, R. Coppola, F. Fiori, M. Magnani, *Microstructural evolution, under tempering at 700°C, in a steel for fusion reactors*, Physica B, 234-236 (1997) 999 – 1002
- 64) G. Albertini, F. Carsughi, R. Coppola, R. K. Heenan, M. Stefanon, *Comparison of Small-Angle Neutron Scattering of δ' -Precipitation in an Al-Li Alloy at a High-Flux Reactor and at a Pulsed-neutron Source*, J. Appl. Cryst. 30 (1997) 602 – 606
- 65) R. Coppola, F. Fiori, E. A. Little, M. Magnani, *A microstructural comparison of two nuclear-grade martensitic steels using small-angle neutron scattering*, J. Nuc. Mat. 245 (1997) 131 -137
- 66) C. Braham. M. Ceretti, R. Coppola, A. Lodini, C. Nardi, *X-ray and neutron diffraction study of residual stresses in electron-beam welded F82H modified martensitic steel for*

fusion reactors, Proc. ICRS-5Conf., Linköping, June 1997 p. 169-174, T. Ericsson, M Odén, A. Andersson Ed.s ISBN 91-7219-210-0

- 67) R. Coppola, R. Kampmann, M. Magnani, P. Staron, *Microstructural characterization, using polarized neutron scattering, of a martensitic steel for fusion reactors*, Acta Mat. 46 (1998) 5447-5456 [https://doi.org/10.1016/S1359-6454\(98\)00189-X](https://doi.org/10.1016/S1359-6454(98)00189-X)
- 68) R. Coppola, K. Ehrlich, M. Magnani, E. Materna-Morris, M. Valli, *Microstructural characterization of F82H-mod. Steel using small-angle neutron scattering*, J. Nucl. Mat. 258-263 (1998) 1291-1294
- 69) M. Ceretti, R. Coppola, E. Di Pietro, C. Nardi, *High-temperature residual strain measurements, using neutron diffraction, in brazed Cu/CFC graphite divertor structures*, J. Nuc. Mat. 258-263 (1998) 1005 – 1009
- 70) R. Coppola, P. Lukàs, P. Mikula, M. Vràna, *Neutron diffraction line broadening in a tempered martensitic steel for fusion reactors*, PhysicaB 241-243 (1998) 1261-1263
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