

**Curriculum Vitae** 

#### PERSONAL INFORMATION

### Guagliardi Antonietta

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- 🔀 antonella.guagliardi@ic.cnr.it
- http://toscalab.uninsubria.it/index.php/people
- Skype ID: antonella.guagliardi

Sex F | Date of birth 09/06/1962 | Nationality Italian

ORCID ID: orcid.org/0000-0001-6390-2114 Researcher ID: K-4471-2015 Scopus ID: 7003289329 H-index: **34**, Total Nr. of citations: **28300**, Average Citations per Item: **186** (Web of Science)

#### WORK EXPERIENCE

#### From 2008 – till now Researcher, Senior since 01/2021

Istituto di Cristallografia - CNR, Como Unit @ Dipartimento di Scienza e Alta Tecnologia, University of Insubria

Main activities and responsibilities: Team Leader and project coordinator, fundamental and applied research in nano-crystallography; development of innovative experimental and computational tools for characterizing nanocrystals, nanocomposites, multiple-scale systems; investigating structure-properties correlation in metals, semiconductors, oxides and bioceramics at the nanoscale; experiments at large scales facilities; supervisor of master thesis and PhD students in Chemistry. Co-founder of the Total Scattering Laboratory (Toscalab.uninsubria.it) jointly with University of Insubria (since 2012, Prot. 17080 del 5/11/2012 Uni-Insubria, Convenzioni Operative DiSat-IC-CNR 2012 and 2015). Educational and outreach activities through organization of/participation in workshops, schools, conferences, seminars and exhibitions.

National Scientific Qualification as Full Professor, sectors 03/B1 (2019) and 03/A2 (2021).

**Business or sector Public Research** 

#### From 1998 – to 2008 Researcher

Istituto di Cristallografia -- CNR, Bari

Main activities and responsibilities: fundamental and applied research, crystallographic methods, since 2003 starting to set my own research line(s) focused on nanocrystallography and X-ray Total scattering methods, including experimental, modelling, analytical and structure-property correlation aspects. Business or sector Public Research

#### From 1994 – to 1998 Researcher

Istituto di Cristallografia -- CNR, Bari

Main activities and responsibilities: research, crystallographic methods for structure solution, quantitative phase analysis of mixtures, Rietveld methods, crystallographic computing, development of software packages, Lab assistant at Uni Bari, supervisor of young collaborators and post-docs. Business or sector Public Research

 From 1991 – to 1994
 Term Contract Researcher

 Dipartimento di Geomineralogia, University of Bari

 Main activities and responsibilities: research, crystallographic methods, crystallographic computing.

 Business or sector Public Research

#### **EDUCATION AND TRAINING**

01/2015 PhD in Chemistry



Education organisation: University of Insubria, Como, Italy

Title of the PhD Thesis: Structure-Property Investigation of Nanomaterials by Debye Function Analysis

#### 1989 – 1991 Two-years fellowship in Crystallography

Education organisation: Istituto per lo Sviluppo di Metodologie Cristallografiche, IRMEC-CNR (later moved to Istituto di Cristallografia, IC), Bari, under the supervision of Prof. Carmelo Giacovazzo

List of main topics and skills acquired: Crystallographic Computing; X-ray diffraction techniques; ab-initio structure solution from single crystal and powder X-ray diffraction; crystallographic software for single crystal data analysis

#### 07/1987 Master Degree in Geology Education organisation: University of Bari Level in National classification: 110/110 cum laude

Visiting Fellowships: University of Lund (1996) and of Stockholm (1998), Department of Structural Chemistry; University of Malaga (Spain, 2001), Departamento de Quimica Inorganica, Cristalografia y Mineralogia

#### **RESEARCH ACTIVITY**

#### Research Sectors and Expertise

Nanocrystallography, Structure, Defects, Strain, Size, Morphological and Surface characterization of nanocrystals (NCs), nanostructures, nanocomposites, multi-scale systems and disordered materials, through X-ray Total scattering methods (WAXTS, SAXS). Modelling by Debye Scattering Equation of nanocrystalline materials. Structure-property correlations at the atomic/nano scale.

Experimental and computational methods for Wide Angle X-ray Total Scattering and Powder Diffraction Techniques at Laboratory and Large Scale Facilities; development of protocols for WAXTS data collection, data reduction and data analysis of nanomaterials; combination of methods in reciprocal (DSE) and direct space (PDF); multiscale characterization of nanomaterials through combination of Small and wide angle X-ray scattering and combination of X-ray and Light scattering methods.

Crystallographic Computing, Ab initio crystal structure determination by single crystal and powder diffraction methods, Whole Powder Profile Fitting Techniques, Rietveld Method and Quantitative Phase Analysis of mixtures.

Classes of nano/defective materials investigated through suitably developed atomistic models: metals, oxides, semiconductors, nano-bioceramics, nanocomposites, coordination polymers, pharmaceuticals. Expertise on: colloidal lead chalcogenide QDs (PbS/PbSe) with organic and inorganic ligands; cadmium selenide and cadmium sulphide QDs, CdSe-CdS core-shell with organic and inorganic ligands; hybrid and fully inorganic Lead Halide Perovskites NCs; superparamagnetic iron oxide nanoparticles; Titanium Oxide nanorods and amorphous silicatianium oxide nanocomposites for photocatalytic applications; nanoparticles self-assembly; Metal Organic Frameworks; Bio-inspired nanoceramics and organic/inorganic composites (collagen/apatite) for Bone Tissue Engineering; nano-drugs; NPs for agro-food applications.

#### Recent Activity and Projects

Principal Investigator of CNR Unit, MIUR Prin 2017, PE5, Linea A (Rif. 2017L8WW48, DD n. 1554 del 31.07.2019), project HY-TEC, 2019-2022 (346720 Euro), in partnership with University of Insubria (coordinator) and University of Palermo.

Principal Investigator of IC-CNR for the following projects:

Cariplo Foundation, Call 2016 Rst-Ricerca Integrata sulle Biotecnologie Industriali e sulla bioeconomia, Project N. 2016-0648 - "Romancing the Stone: size-controlled HYdroxy-aPAtite for susTainable Agriculture (HYPATIA)", 2017-2019, (280000 Euro), Istituto di Cristallografia (IC-CNR) in partnership with University of Insubria (coordinator).

Cariplo Foundation, Call Ricerca Scientifica e tecnologica sui materiali avanzati 2011-2014, Project N. 2011-0289 -"Metal-Organic-based Nanocrystal Arrays with Large Induced Shape Anisotropy (MONA LISA)" (400000 Euro). Istituto di Cristallografia (IC-CNR) in partnership with University of Insubria (coordinator) and University of Bologna.

Cariplo Foundation, Call Ricerca Scientifica e tecnologica sui materiali avanzati 2009-2012, Project N. 2009-2446 -"Nanocrystals of technological and biomedical insterest: structural and functional aspects" (300000 Euro). Istituto di Cristallografia (IC-CNR) in partnership with University of Insubria (coordinator) e Stazione Sperimentale per la Seta. *Experience @ Large Scale Facilities* (since 2006): X-ray Total Scattering Experiments at Materials Science Beamlines of the Swiss Light Source (SLS), ALBA, ESRF, on Nanomaterials, QDs, Biomaterials, MOFs. **23 proposals accepted**, as main proposer/co-proposer, of which:



- 18 proposals at MS-X04SA of the Swiss Light Source, proposals ID: 20210699, 20201385, 20200760, 20191610, 20190685, 20190316, 20191610, 20180491, 20171654; 20171587; 20161487; 20161224; 20160403; 20151333; 20140873; 20131253; 20120960; 20061216; 20060430;
- 1 joint SLS-SINQ proposal (SLS ID: 20170937, SINQ ID: 20170143);
- ♦ 2 proposals at BL11-NCD of ALBA synchrotron (proposals ID: 2015091427; 2016091848);

2 proposals at ESRF (BM26B, 26-02-771; ID22, CH-5157).

#### Articles and Books

I have co-authored more 120 papers in peer-reviewed international journals in Crystallography, Chemistry, Material Science. **H-index= 34**, Sum of **citations** without self-citations **> 28000**, Average citation per item **>** 186 (Source: Web of Science). Over 100 communications at National and International conferences. I have co-authored 11 book chapters and co-edited 3 books.

Talks and Seminars

More than 50 invited lectures, talks and seminars at Conferences, Schools, Workshops. Among them: Florianopolis, Brasil, Total Scattering Analysis for nanoScience in Latin America, Florianópolis, Santa Catarina, Brazil, 2018; *invited KN speaker*, 3rd Joint AIC-SILS Conference, Rome (Italy), 2018; Invited KN Lecture, Workshop Nanomat@AU -Forefront methodologies and advances in nanomaterials characterization, Aarhus, DK, 2018; *Invited Lecture*, CCMX-PSI Powder Diffraction Summer School, Modern Synchrotron Methods, Paul Scherrer Institute, 2018; *Invited Lecture*, PDS2020, PDS2016, Paul Scherrer Institute, 2016; Florianopolis, Brasil, ECRISLA 2015, 3rd Edition of the School of Crystallization and Crystallography for Latin America, Federal University of Santa Caterina; European Crystallographic School, Pavia, (IT), 2014; invited seminar at ETH, Zurich, 2014; invited KN Lecture, Workshop Natta's seeds grow, Milano (IT), 2013; invited talk, Goldschmidt Conference, Florence (IT), 2013; invited seminars, Scuola di Dottorato di Ricerca in Nanotecnologie, Università di Trieste, 2012; Course on XRPD structural and nanostructural analysis of polycrystalline materials, IACT-CSIC, Spain 2011. Talks in International Conferences: European Crystallographic Meeting, Croatia, 2015; European Powder Diffraction Conference, Grenoble, 2012 and Aarhus, 2014; International Union of Crystallography Conference, Madrid, Spain (2011). *Talks in National Conferences*: AIC-SILS Joint Conference, Firenze, 2014; Congresso AIC, Verona, 2012; Convegno SILS, Cosenza 2012.

#### PERSONAL SKILLS

Org

Mother tongue(s)	Italian					
Other language(s)	UNDERSTANDING		SPEAKING		WRITING	
	Listening	Reading	Spoken interaction	Spoken production		
English	Excellent	Excellent	Excellent	Excellent	Excellent	
	C1					
French	Scholastic	Scholastic	Scholastic	Scholastic	Scholastic	
	my attitude to multidisciplinary scientific aspects, gained through my experience in collaborating with physicists; chemists, geologists, biologists (both experimentalists and theoreticians); good skills in interacting with, and engaging young researchers, pushed by my enthusiasm towards the research activity and determination in pursuing and achieving the objectives.					
anisational / managerial skills	Good organisational / managerial skills, gained through the activity of research team leader (students/post- docs), project coordinator, chairs and organizers of many scientific events (workshops, schools, conferences					
Computer skills	High level command of language (Fortran 2000), o Crystallography, CNR, use	Unix and Microsoft co-author of 6 softw d in thousands of nat	Windows platforms are packages develo tional and internation	s; knowledge of scie oped at (and licenced al Labs (Sir92, Sir97, S	entific programming I by) the Institute of Sirpow, Extra, Expo,	



Quanto). Presently involved in the Open Source project **DebUsSy Suite** (available at <u>http://debussy.sourceforge.net</u>).

## ADDITIONAL INFORMATION

- Publications
- F. Bertolotti, A. Vivani, F. Ferrti, P. Anzini, A. Cervellino, M.I. Bodnarchuk, G. Nedelcu, C. Bernasconi, M.V. Kovalenko, N. Masciocchi, **A. Guagliardi**, *Size Segregation and Atomic Structural Coherence in Spontaneous*
- Assemblies of Colloidal Cesium Lead Halide Nanocrystals. CHEMISTRY OF MATERIALS, (2022), 34, 594-608
   F. Bertolotti, G. Nedelcu, A. Vivani, A. Cervellino, N. Masciocchi, A. Guagliardi, M.V. Kovalenko
- F. Bertolotti, G. Nedelcu, A. Vivani, A. Cervellino, N. Masclocchi, A. Guagilardi, M.V. Kovalenko Crystal Structure, Morphology, and Surface Termination of Cyan-Emissive, Six-Monolayers-Thick CsPbBr<sub>3</sub> Nanoplatelets from X-ray Total Scattering, ACS Nano, (2019),13, 14294-14307
- D. Moscheni, F. Bertolotti, L. Piveteau, L. Protesescu, D.N. Dirin, M.V. Kovalenko, A. Cervellino, J.S. Pedersen, N. Masciocchi, A. Guagliardi. Size-Dependent Fault-Driven Relaxation and Faceting in Zincblende CdSe Colloidal Quantum Dots. ACS Nano 12, (2018), 12558-12570
- I. Lignos, V. Morad, Y. Shynkarenko, C. Bernasconi, R.M. Maceiczyk, L. Protesescu, F. Bertolotti, S. Kumar, S.T. Ochsenbein, N. Masciocchi, A. Guagliardi, C.-J. Shih, M.I. Bodnarchuk, A.J. deMello, M.V. Kovalenko. *Exploration of Near Infrared-Emissive Colloidal Multinary Lead Halide Perovskite Nanocrystals using* an Automated Microfluidic Platform. ACS Nano (2018), 12, 5504-5517
- F. Bertolotti, L. Protesescu, M.V. Kovalenko, S. Yakunin, A. Cervellino, S.J.L. Billinge, M.W. Terban, J.S. Pedersen, N. Masciocchi, A. Guagliardi. Coherent Nanotwins and Dynamic Disorder in Cesium Lead Halide Perovskite Nanocrystals. ACS NANO (2017), 11, 3819-3831
- L. Protesescu, S. Yakunin, S. Kumar, J. Bär, F. Bertolotti, N. Masciocchi, A. Guagliardi, M. Grotevent, I. Shorubalko, M.I. Bodnarchuk, C.-J. Shihand, M.V. Kovalenko. *Dismantling the "Red Wall" of Colloidal Perovskites: Highly Luminescent Formamidinium and Formamidinium-Cesium Lead Iodide Nanocrystals.* ACS NANO (2017), 11, 3119–3134
- F. Bertolotti, D.N. Dirin, M. Ibáñez, F. Krumeich, A. Cervellino, R. Frison, O. Voznyy, E.H. Sargent, M.V. Kovalenko, A. Guagliardi and N. Masciocchi. *Crystal symmetry breaking and vacancies in colloidal lead chalcogenide quantum dots*. NATURE MATERIALS, (2016) 15, 987-994
- J. A. Mason, J. Oktawiec, M. K. Taylor, M. R. Hudson, J. Rodriguez, J. E. Bachman, M. I. Gonzalez, A. Cervellino, A. Guagliardi, C. M. Brown, P. L. Llewellyn, N. Masciocchi and J. R. Long. *Methane storage in flexible metal-*organic frameworks with intrinsic thermal management. NATURE (2015), 527, 357-361
- Delgado-López JM, Frison R, Cervellino A, Gómez-Morales J, Guagliardi A, Masciocchi N. Crystal Size, Morphology and Growth Mechanism in Bio-inspired Apatite Nanocrystals. ADVANCED FUNCTIONAL MATERIALS, (2014), 24, 1090- 1099
- Frison R, Cernuto G, Cervellino A, Zaharko O, Colonna GM, Guagliardi A, Masciocchi N. Magnetite-Maghemite Nanoparticles in the 5-15 nm Range: Correlating the Core-Shell Composition and the Surface Structure to the Magnetic Properties. A Total Scattering Study. CHEMISTRY OF MATERIALS, (2013), 25, 4820-4827

Conferences and workshops

s and Chair or member of Scientific and Organizing Committees

hops Sibenik (HR), 31/05/2022, European Powder Diffraction Conference, EPDIC-16 (Program Committee)

Edinburgh (IT), 07/2018, European Powder Diffraction Conference, EPDIC-16 (PC)

Bari (IT), 06/2016, European Powder Diffraction Conference, EPDIC-15 (PC)

Rovinj (HR), 08/2015, 29<sup>th</sup> European Crystallographic Meeting, ECM-29(PC)

Aarhus (DK), 06/2014, European Powder Diffraction Conference, EPDIC-14 (PC)

Como (IT), 09/2013, International joint Meeting of Italian, Spanish and Swiss Crystallographic Associations (MISSCA2013) (Organizing Committee)

Grenoble (F), 10/2012, European Powder Diffraction Conference, EPDIC-13 (PC)

Darmstadt (D), 08/2010, European Powder Diffraction Conference, EPDIC-12 (PC)

Martina Franca (IT), 09/2007, Workshop on Advanced Methods in X-Ray Charge Density Analysis (OC)

Martina Franca (IT), 09/2000, National Congress of the Italian Crystallographic Association (OC)

Bari (IT), 12/1996, International V SIR workshop: Single Crystal and Powder Data, X-rays, Neutrons and Electrons (Organizing and Program Committee)

Bari (IT), 04/1993, International IV SIR workshop: SIR92 – SIRPOW.92, Two powerful tools for solving crystal structures via single crystal and powder data (Organizing and Program Committee)



Curriculum Vitae

Schools	Lake Como School of Advanced Studies, Como (IT) 05/2019, <i>Toscalake 3.0: Total Scattering for Nanotechnology on the Como Lake</i> – (Chair) 05/2017, <i>Toscalake 2.0: Total Scattering for Nanotechnology on the Como Lake</i> – (Chair) 05/2015, <i>Toscalake: Total Scattering for Nanotechnology on the Como Lake</i> – (Chair) International Insubria Summer School, Como (IT), 06/2012, <i>Crystallography for Health and Biosciences</i> (IISS) – (Chair) Camerino (IT), 07/2011, <i>Crystallography beyond Diffraction</i> (AIC School) (OC) Villigen (CH), 05/2010, <i>Diffraction at the Nanoscale</i> (PSI-AIC-SGK School) (PC and OC) Camerino (IT), 09/2009, <i>Scattering Techniques: from microscopic to atomic structures</i> (AIC School) (chair) Villigen (CH), 06/2008, <i>Structure Determination from Powder Diffraction Data</i> (PSI-AIC-SGK School) (PC, OC) Martina Franca (IT), 06/2006, <i>Scuola di Diffrazione da Materiali Policristallini</i> (AIC School, chair)			
Reviewer activity	Reviewer for many high IF journals in Chemistry and Material Science (Nature Materials, Science, Scientific Reports, Journal of The American Chemical Society, Chemistry of Materials, ACS Nano, ACS Energy Letter, Advanced Functional Materials, Applied Materials and Interfaces, Crystal Growth & Design, Nanoscale, Acta Biomaterialia, CrystEngComm, IUCrJ, Journal of Applied Crystallography, Acta Crystallographica A and B, Powder Diffraction). Referee of national (PRIN) and international (Rumanian Agency Funding) projects. Referee in the Register of Expert Peer Reviewers for Italian Scientific Evaluation (REPRISE). Referee of VQR 2011-2014/VQR 2015-2019. Panel member of the Research Foundation – Flanders (FWO) (2021-2023).			
PhD supervision and examination	<ul> <li>Supervisor of PhD candidates in Chemical and Environmental Sciences, University of Insubria (Italy)</li> <li>Filippo Tavormina (XXXVII cycle), PhD project: Perovskite materials for sustainable and efficient PV solar cells technology.</li> <li>Lucia Allara (XXXVII cycle), PhD project: Machine Learning applied to the X-ray scattering of semiconductor nanocrystals.</li> <li>Anna Vivani (XXXIV cycle), PhD Thesis: Metal Halide Perovskite Nanocrystals: from Synthesis to Structure and Function.</li> <li>Daniele Moscheni (XXXI cycle), PhD Thesis: A Comprehensive Multi-Scale Modeling of Defective CdSe Colloidal Nanocrystals through Advanced X-ray Scattering Techniques</li> <li>Member of PhD Thesis Examination International Committees: Technical University of Denmark, (2008); and for PhD in "Ingegneria e Scienze dei Materiali", aa 2013/2014, Università di Trento (IT). (Decreto Rettoriale 165-RET, 25 Marzo 2015).</li> <li>Member of technical Committees: bando CNR n. 310.2.102/M, codice settore BA 192/1, Prot. 126/01/C 19/11/2001, and BA 192/2 Prot. 127/01/C 19/11/2001 for recruitment of 4 staff Researchers at IRMEC-</li> </ul>			

# AUTORIZZO IL TRATTAMENTO DEI DATI PERSONALI, IVI COMPRESI QUELLI SENSIBILI, AI SENSI DEL D.LGS 196/03.

diffractomer, decreto direttore IRMEC-CNR, No. 115 del 02/05/2002.

CNR; chair of the committee for equipment performance testing of one single crystal and one powder

Como, 19 Aprile 2022

In Fede