Asmaa Qdemat

+49-1777585738 a.qdemat@fz-juelich.de Jülich, 52428 Germany

Summary

I am currently working as an instrument responsible for the GALAXI high-resolution diffractometer at the Jülich Center for Neutron Science (JCNS), Forschungszentrum Jülich, Germany. My research focuses on the structure and magnetization of nanoscale materials, especially magnetic surfaces and interfaces in magnetic nanoparticles and nanostructures. I have extensive experience with X-ray scattering techniques **(SAXS, GISAXS, XRR)** and neutron scattering with polarization analysis **(GISANS, PNR)**. In addition, I have expertise in macroscopic magnetization measurements and scanning electron microscopy (SEM).

Education

PhD

RWTH Aachen University, Forschungszentrum Jülich/ Aachen - Germany — Feb. 2016 to Dec. 2020

- Physics
- Thesis title: "Nanoparticle assemblies: Order by self-organization and collective magnetism"

MSc

Al-Quds University and Forschungszentrum Jülich / Jerusalem - Palestine and Jülich – Germany — Feb. 2013 to Jan. 2016

- Physics
- Thesis title: "Ordering Phenomena in Magnetic Nanoparticle Assemblies"

BA

Al-Quds University / Jerusalem - Palestine — Oct. 2009 to Jan. 2013

- Physics

High school degree / Hebron – Palestine — Aug.1997 to JuL.2009

Professional Experience

Scientific Staff / Instrument Responsible for GALAXI - High-resolution diffractometer — Forschungszentrum Jülich, Germany, Jan. 2024 - present

- Supervise bachelor's and master's students and co-supervise a Ph.D. student
- Assistant for user research with PNR and GISANS beam times.

Neutron instrument scientist — Institut Laue-Langevin (ILL), Grenoble, France, Feb.2023 to Jul.2023

- D17- Neutron Reflectometer

Postdoctoral researcher — Forschungszentrum Jülich, Germany, Jan.2021 to Dec.2023

- Co-responsible for GALAXI Instrument and users responsible
- Supervise bachelor's and master's students and co-supervise a PhD student
- Leader of the nanoscience research cluster under the Palestinian German Science Bridge (PGSB)
- Running my research project on *"Tuning shape-imposed anisotropy via magnetic multilayers on self-organized nanospheres"*
- *User reseqrch assistant with SQUID magnetometry and SEM*

Postdoctoral researcher — University of Cologne, Cologne, Germany, Nov.2019 to Nov.2020

- Research: Self-assembly of magnetic nanoparticles and study of their structural and magnetic properties (internal and external: neutron scattering (POLSANS), synchrotron X-ray scattering)
- Supervise internships (P-module) and co-supervision of B.Sc. and MSc Work

Teaching assistance — Al-Quds University, Jerusalem, Palestine, Feb.2012 to Aug.2012

Tutor in Neutron Scattering Laboratory Course

Forschungszentrum Jülich,
Jülich, Germany
Sep.2016 to Sep.2022

Publications

Manipulation of dipolar magnetism in low-dimensional iron oxide nanoparticle assemblies — Feb. 2019

Wang, L.M, ***Qdemat, A***, Petracic, O, Kentzinger, E, Rücker, U, Zheng, F, Lu, P.H, Wei, X.K, Dunin-Borkowski, R. E, Brückel, T

10.1039/C9CP00302A

Self assembled monolayer of silica nanoparticles with improved order by drop casting — Apr. 2020

Qdemat, A, Kentzinger, E, Buitenhuis, J, Rücker, U, Ganeva, M, Brückel, T

10.1039/D0RA00936A

Enhanced Ibuprofen Adsorption and Desorption on Synthesized Functionalized Magnetic Multiwall Carbon Nanotubes from Aqueous Solution — Jul. 2020

Hanbali, G, Jodeh, S, Hamed, H, Bol, R, Khalaf, B, ***Qdemat, A***, Samhan, E

10.3390/ma13153329

Magnetic Multiwall Carbon Nanotube Decorated with Novel Functionalities: Synthesis and Application as Adsorbents for Lead Removal from Aqueous Medium — Aug. 2020

Hanbali, G, Jodeh, S, Hamed, H, Bol, R, Khalaf, B, ***Qdemat, A***, Dagdag, O

10.3390/pr8080986

Nanoparticle assemblies: Order by self-organization and collective magnetism — Dec. 2020

Qdemat, A

http://hdl.handle.net/2128/26781

Unravelling Magnetic Nanochain Formation in Dispersion for In Vivo Applications — May. 2021

Nandakumaran, N,Barnsley, L, Feoktystov, A, Ivanov, S. A, Huber, D. L , Leffler, V, Ehlert, S, Kentzinger, E, ***Qdemat, A***, Schöffmann, T.B, Rücker, U, Wharmby, M. T, Cervellino, A, Borkowski, R. E, Brückel, T, Feygenson, M

10.1002/adma.202008683

Neither Sphere nor Cube—Analyzing the Particle Shape Using Small-Angle Scattering and the Superball Model — Oct. 2021

Dresen, D, ***Qdemat, A***, Ulusoy, S, Zákutná, D, Wetterskog, E, Kentzinger, E, Alvarez, G.S, Disch, S

10.1021/acs.jpcc.1c06082

Using small-angle scattering to guide functional magnetic nanoparticle design — Jan. 2022

Honecker, D, Bersweiler, M, Erokhin, S, Berkov, D, Chesnel, K, Venero, A.V, ***Qdemat, A***, Disch, S, Jochum, J,Michels, A, Bender, P

10.1039/D1NA00482D

Magnetic Coupling in Cobalt-Doped Iron Oxide Core–Shell Nanoparticles: Exchange Pinning through Epitaxial Alignment — Mar. 2023

Zákutnár, D, Rouzbeh, N, Nižňanský, D, Duchoň, J, ***Qdemat, A***, Kentzinger, E, Honecker, D, Disch, S, Jochum, J

10.1021/acs.chemmater.2c02813

Probing spin waves in Co3O4 nanoparticles for magnonics applications — Jan. 2024

Feygenson, M, Huang, Z, Xiao, Y, Teng, X, Lohstroh, W, Nandakumaran, N, Neuefeind, J.C, Everett, M, Podlesnyak, A.A, Alvarez, G.A, Ulusoy, S, Valvo, M, Su, Y, Ehlert, S, ***Qdemat, A***, Ganeva, M, Zhang, L, Aronson, M.C, Jochum, J

10.1039/d3nr04424f

Conferences and workshops

First Palestinian-German science bridge (PGSB) workshop, Jülich, Germany Dec.2016

DPG Frühjahrstagung of the Condensed Matter Section, Dresden, Germany Mar.2017

- Talk: "Structural and magnetic characterizations of highly ordered arrangements of magnetic nanoparticles"

JCNS workshop, Tutzing, Germany Oct.2017

Second Palestinian-German science bridge (PGSB) workshop, Ramallah, Palestine Nov.2017

- Talk: "The structural and magnetic properties of ordered arrangements of magnetic nanoparticles"

Scientific Evaluation of the Research Field Matter, POF, Jülich, Germany Dec.2017

DPG Frühjahrstagung of the Condensed Matter Section, Dresden, Germany Mar.2018

- Talk: "Chemical and magnetic characterizations of ordered arrangements of magnetic nanoparticles"

4th International GISAS conference, Gyeongju Hwabaek International Convention Center (HICO), Gyeongju, Korea Sep.2018

SNI2018 German conference for research with synchrotron radiation, neutrons, and ion beams at large facilities, Garching, Munich, Germany Sep.2018

- Poster: "The structural and magnetic properties of ordered arrangements of magnetic nanoparticles"

Third Palestinian-German science bridge (PGSB) workshop, Jülich, Germany Nov.2018

4th International science meeting of the MLZ, Semparthaus Grainau, Germany Jun.2019

Carnival Conference Session (CCS 220), University of Cologne, Germany Feb.2020

29th annual meeting of the German Crystallographic Society (DGK), virtual event Mar.2021

- Talk: "Self assembled monolayer of silica nanoparticles with improved order by drop casting"

GISAS 2022, Hamburg, Germany Nov.2022

PostDoc workshop, Jülich, Germany Nov.2022

- Poster: "Nanoparticles assemblies, Order by self-organization and collective magnetism"

HESEB-PGSB Colloquium, Jülich, Germany Jan.2023

- Poster: "Research of Quantum Materials and Collective Phenomena at JCNS-2 using X-ray and Neutron scattering instruments"

SESAME Germany info Day, Hamburg, Germany Apr.2023 / invited speaker

- Talk: "Small Angle X-Ray Scattering for Studying Nanostructured Systems "

18th SESAME Users' Meeting, Jordan May.2023 / invited speaker

Peter Grünberg Institute Day, Jülich, Germany Aug.2023

- Poster: "Tuning shape-imposed anisotropy via magnetic multilayers on self-organized nanospheres"

The European Materials Research Society (E-MRS), University of Technology in Warsaw, Poland Sep.2023

- Talk: "Tuning shape-imposed anisotropy via magnetic multilayers on self-organized nanospheres"

The fourth workshop on Science of the Program (MML), Friedrich-Schiller University Jena, Germany Sep.2023 / invited speaker

- Talk: "Geometric tuning of the structural and magnetic properties of magnetic thin films

LINXS Young Researchers' Symposium on Hard Condensed Matter – X-ray and Neutron techniques, Lund, Sweden Nov.2023 / invited speaker

- Talk: "X-ray and neutron scattering-based methods for studying nanostructured systems – a focus on the small angles "

Projects

Curvature-modulated structural and magnetic properties of thin films deposited onto highly ordered nanosphere arrays Own research

Controlled Organization of Silica Nanospheres into Highly Ordered Monolayers on a Substrate Bachelor student

Dynamics of magnetic nanoparticles under the influence of magnetic fields: BornAgain simulation Bachelor student

Application of nanoparticles in agriculture and their role in disease management Bachelor student

Structural and magnetic characterization of Iron-Oxide nanoparticle dispersions upon freezing and melting Master student

Structural and magnetic characterization of superparamagnetic iron oxide nanoparticles for magnetically controlled immune therapy PhD student

Structural and magnetic properties of epitaxial iron oxide nanoislands on $SrTiO_3$ Collaboration project

Investigation of magnetization switching in iron oxide thin film/ silica nanoparticles heterostructures Collaboration project

Oxygen-Vacancies-Driven Resistive Switching in Epitaxial Fe_3O_4 Thin Films Collaboration project

Expertise

programming languages: Python, MATLAB

Softwares: Visual Studio, Microsoft Windows, Gnuplot, OriginLab, Linux, ImageJ, GenX, BornAgain, GRASP, SasView, LaTeX, Gwyddion, Fit2D, IsGISAXS

Experiments: small angle x-ray and polarized neutron scattering **(SAXS / POLSANS)**, X-ray reflectometry **(XRR)**, polarized neutron reflectometry **(PNR)**, Grazing incidence small angle x-ray / neutron scattering **(GISAXS / GISANS)**, X-ray photon correlation spectroscopy **(XPCS)**, Wide angle x-ray scattering **(WAXS)**, Dynamic light scattering **(DLS)**, Atomic Force Microscopy **(AFM)**, Scanning Electron Microscopy **(SEM)**, Macroscopic magnetization measurements **(SQUID, VSM)**, Energy Dispersive X-Ray Analysis **(EDX)**, X-ray diffraction **(XRD)**

Sample preparation: Highly ordered arrangements of nanoparticles on surface **(Nanoparticles assemblies)**, Template assisted assemblies , Biosynthesis of silver nanoparticles, Thin Film Growth

Instruments: GALAXI & **GANESHA** (FZJ, Jülich), **P10** (PETRA III, DESY), **MARIA** (MLZ, Garching), **D17** (ILL, France), **D33** (ILL, France), **QUOKKA**, (ANSTO, Australia), **HERMES** (Soleil, Paris), **SuperAdam** (ILL, France)

Research interests

- Magnetism, 3D nanomagnetism
- Magnetic Nanoparticles, magnetic thin film
- Magnetic Nanostructures
- Polarized neutron reflectometry
- Grazing incidence small angle x-ray and neutron scattering
- Small angle x-ray and neutron scattering
- Modeling and simulation
- Neutron reflectivity for hard-soft matter research
- Magnetic nanoparticles for biomedical applications

Trainings

- 44th IFF Spring School, Quantum Information Processing, March 2013 Jülich, Germany
- 17th JCNS Laboratory Course - Neutron Scattering 2013, Jülich/Garching, Germany
- 50th IFF Spring School, Scattering! Soft, Functional and Quantum Materials March 2019, Jülich, Germany
- Multicultural training, February 2021, Jülich, Germany
- Applying for 3rd party funding, June 2021, Jülich, Germany
- Scientific writing and Scientific presentation, August 2021, Jülich, Germany
- Project management, August 2021, Jülich, Germany

Memberships

- Organization for Women in Science for the Developing World
- LINXS Junior Fellow - Young Researcher Initiative
- German Physical Society

Other activities

- Organizing NanoDose workshop, 2019, Jülich, Germany
- Establish the Nanoscience research cluster, 2021, between between Forschungszentrum Jülich and the Palestinian universities
- Organizing JCNS International Workshop 2024, Tutzing, Germany
- Organizing Young Researchers Symposium in hard condensed matter 2024, Lund, Sweden

Languages

Arabic: Native

English Advanced

German: Basic conversations

Interests and hobbies

Reading, Cycling, Traveling, Cooking, Handcrafts

References

- **Prof. Dr. Thomas Brückel**, Director of JCNS2 and PGI4 Institute, Forschungszentrum Jülich GmbH, Germany, ***t.brueckel@fz-juelich.de***
- **Dr. Emmanuel Kentzinger**, Scientific Staff at JCNS2 and PGI4 Institute, Forschungszentrum Jülich GmbH, Germany, ***e.kentzinger@fz-juelich.de***
- **Prof. Dr. Sabrina Disch**, University of Duisburg-Essen, Germany ***sabrina.disch@uni-due.de***
- **Prof. Dr. Ghaleb Natour**, Director Central Institute of Engineering, Electronics and Analytics (ZEA), Forschungszentrum Jülich GmbH, Germany, ***g.natour@fz-juelich.de***
- **Dr. Thomas Saerbeck**, Instrument scientist D17, Institute Laue-Langevin, France, ***saerbeck@ill.eu***