CNRS thematic school of NMR in liquid and solid phases applied to the structural and dynamic characterization of polymer materials.

17th to 19th April, 2024

HOST: IMP Ingénierie des Matériaux Polymères - UMR CNRS 5223 / CNRS DR07

PLACE (THEORETICAL LECTURES AND Round Table): Centre Jean Bosco, 14 rue Roger Radisson - 69005 LYON, FRANCE, https://www.centrejeanbosco.com/

Course overview:

NMR is an essential technique for the characterization of polymer materials, either in solution in an organic solvent or in water, at room temperature or at high temperature, either molten or rubbery state, or in the solid state. The architecture, local structure and dynamics of polymer chains, as well as the determination of reaction kinetic parameters, structural parameters or quantification, are common objects of study, in fundamental, in academic and in industrial environments. NMR is a very commonly chosen analysis technique, both for its precision at the atomic level and for its robustness, for its non-invasive/non-destructive nature and for the possibility of carrying out quantitative analyses. It is in particular irreplaceable for the determination of molecular architectures and the characterization of heterogeneous materials. NMR is particularly essential when it comes to establishing relationships between structure and properties. But, in return, prior knowledge and a significative level of training are necessary to understand and interpret the obtained results, in proportion to the complexity of the experiments which are carried out.

The main objective of the school is the acquisition of an understanding of the NMR methodologies available to date for the characterization of polymer materials. The knowledge of the state of the art in this field shall allow participants: (i) to effectively understand NMR characterization in the most recent innovations in polymer materials science, (ii) to master the concepts to adapt them to their problematics in a reasoned manner (iii) to identify the relevant methodologies to meet their needs, (iv) to master the concepts for the implementation of NMR experiments, (v) to extract the maximum amount of structural, dynamic and quantitative information from NMR experiments.

Schedule:

	Wednesday	Thursday	Friday
	17/04/2024	18/04/2024	19/04/2024
8:30-10:00	Reception and Welcome	Relaxometry and molecular dynamics	Self-diffusion: DOSY experiments
10:00-10:30	Coffee Break	Coffee Break	Coffee Break
10:30-12:00	Microstructure by solution NMR and NMR coupled to SEC	NMR imaging of polymer membranes	Spin diffusion and measurement of heterogeneity scales
12:00-13:30	Lunch	Lunch	Lunch
13:30-15:00	Solid-state NMR and characterization of nanostructured materials	Solid-state DNP applied to polymer materials	Solid-state NMR at very high rotation speed
15:00-16:00	Coffee Break + Poster session	Coffee Break + Poster session	Coffee Break + Poster session
16:00-17:00	Round Table	Round Table	Round Table

Target audience:

This course is aimed to all researchers, teaching staff, engineers and technicians (from academia or industry) who are interested in advance knowledge about the polymer characterisation by NMR spectroscopy.

Participants:

Full course: 15 places reserved for CNRS agents and 13 places for agents from other institutions and industry.

Language:

The school will be taught in English.

Lectures topics:

Microstructure by solution NMR and NMR coupled to SEC

Solid-state NMR and characterization of nanostructured materials

Relaxometry and molecular dynamics

NMR imaging of polymer membranes

Solid-state DNP applied to polymer materials

Self-diffusion: DOSY experiments

Spin diffusion and measurement of heterogeneity scales

Solid-state NMR at very high rotation speed

School instructors:

Gerhard Althoff, BRUKER, Allemagne

Samuel Cousin, ICR, Marseille

Marianne Gaborieau, KIT, Karlsruhe

Cédric Lorthioir, LCMCP, Paris

Sarah Mailhiot, BRUKER, Allemagne

Jean Christophe Perrin, LEMTA, Nancy

Paul Sotta, IMP, Lyon

Stéphane Viel, ICR, Marseille

Poster session:

Participants are invited to present their projects and scientific problematics through posters, encouraging the discussion and exchange of ideas between participants and with the instructors.

Registration deadlines:

The registration will be open from January 15th to April 1st.

How to Register:

The registration will be at our webpage: rmn-et-polymere.sciencesconf.org

Registration Fees:

Fees include accommodation, meals (breakfast, lunch and dinner) and coffee breaks, until Friday noon.

For CNRS agents: financially supported by the CNRS, contact through your delegation "service formation".

For non-CNRS participants : 450€ TTC.

Course payment:

To be announced.

Organisation committee:

Carlos Fernández de Alba (CNRS, IMP)

Fernande Da Cruz-Boisson (CNRS, IMP)

Paul Sotta (CNRS, IMP)

Sponsorship :

BRUKER

GFP (Groupe Français d'Études et d'Applications des Polymères)

Contact and queries:

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