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Isabella Nicotera is an associate professor at the Department of Chemistry and Chemical Technologies of University of Calabria (Italy) and responsible of the research laboratory PCAM-Lab (Physical Chemistry and Applied Materials Laboratory).

She graduated (Laurea Summa cum Laude) in Chemistry at the University of Calabria in 1998, and obtained her PhD in Chemical Science in 2002. Her academic positions include: PhD Research Fellowship at University of Kent, Canterbury (UK) in 2000; Postdoctoral Research Associate position at the University of Calabria (2003-2007); Postdoctoral Research Associate at the City University of New York (CUNY), NY, USA (2005-2006), Researcher and then Associate Professor (Physical Chemistry) since 2008 at the University of Calabria.

The research topic concerns the development and study of materials for electrochemical energy conversion and storage devices, with particular reference to hydrogen and lithium (fuel cells, electrolyzers, batteries). The scientific knowledge focuses on the synthesis and evaluation of hybrid polymer electrolyte membranes for fuel cells and for solid state batteries. Among the advanced techniques, Multinuclear NMR spectroscopy (diffusivity, relaxometry, micro-Imaging and solid-state MAS NMR) is surely her primary experimental technique to investigate the molecular dynamics and ions transport mechanisms in condensed matter.

She is co-author of over 105 publications on international refereed journals, 3 chapters of books and over 80 contributions to national and international conferences (several invited talk).

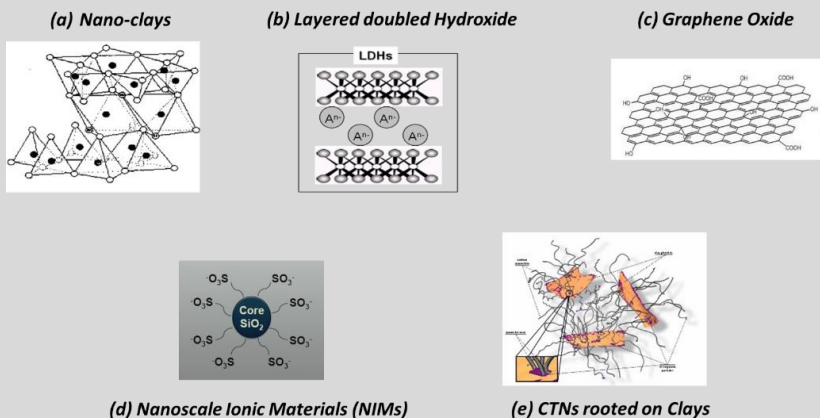
Will lecture on:

Hybrid electrolyte membranes for high temperature PEM fuel cells

Nanocomposites membranes based on hydrophilic nanostructured materials are of great interest for PEMFC applications due to significant gains in thermal stability, mechanical and barrier properties. Smectite clays (a), Layered doubled hydroxide (b), Graphene Oxide (GO) (c) or Nanoscale Ionic Materials (NIM) (d), were properly synthesized and organo-functionalized to interact with the ionomer in order to prepare advanced hybrid electrolytes membranes. Such materials can modulate the nature of water confined in the nanosized ionic channels of Nafion, and, as a result, hybrid membranes show high proton mobility and water retention in dehydrating state.

LDHs and smectite clays are anionic and cationic minerals, respectively, with a unique combination of swelling, intercalation and ion exchange properties. Smectite clays were also functionalized by using simple chemical methods with organic/inorganic guest molecules, or were used as alternative substrate for the growth of carbon nanotubes (CNTs). CNTs (functionalized with RSO₃H groups) rooted on smectite platelets (fig. d) provided outstanding effect on the proton transport properties of the final nanocomposites because an appropriate network favoring the Grotthus-type mechanism for the protons is achieved.

The barrier property of such 2D-materials was valued to reduce the methanol crossover (critical issue in the DMFCs). Additionally, many efforts are devoted in the development of alternative electrolyte membranes to commercial Nafion, based on non-fluorinated ionomers operating in the same temperature range and with much lower crossover.



**Wednesday, May 3rd, 2023
12:15-13:15**

**Lecture Hall 6, 2nd Floor
The Wolfson Department of
Chemical Engineering Building**