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ESSEN

*Open-Minded*

**NU-TEGRAM**



FLAG-ERA

Marika Schleberger ■ Budapest, 13./14.4.2016

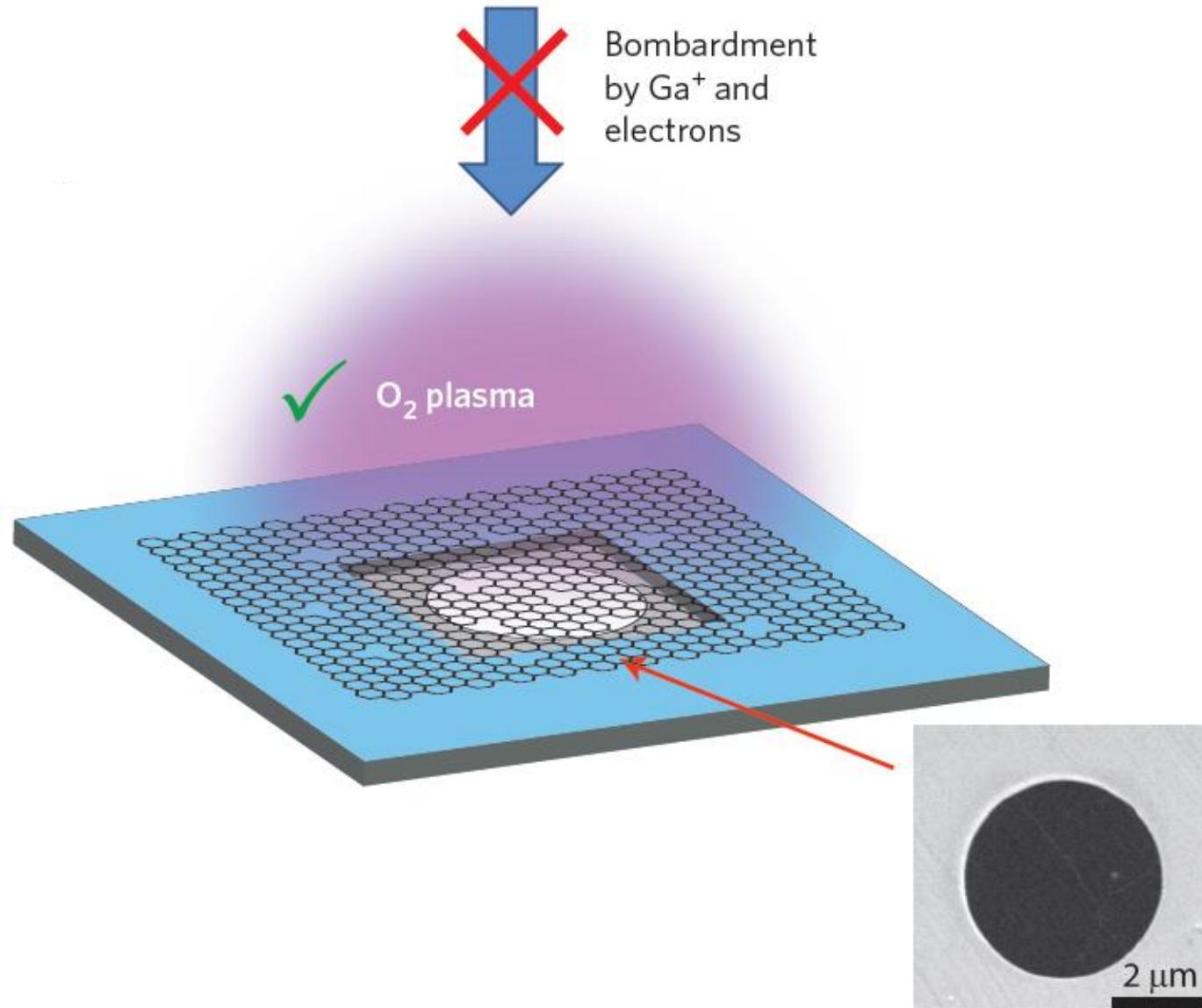
# Nanofluidics and Ultrafiltration with Track Etched Graphene-Polymer Composite Membranes

- Mechanical Strength
- Highly flexible
- High Selectivity
- High Permeability
- Stability & Handling
- Pores
  - Creation
  - Size
  - Distribution
- Scalability & Costs
- Retain specific advantages



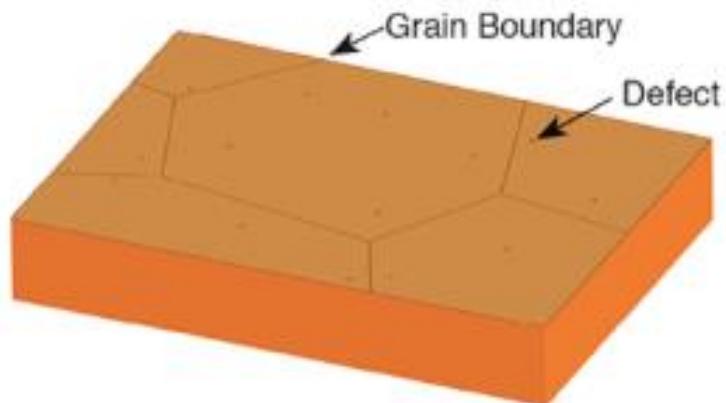
Highly selective filtering membrane  
(desalination, nano- and bio-filtration, ...)

# Key Challenges: Stability and Pore Creation

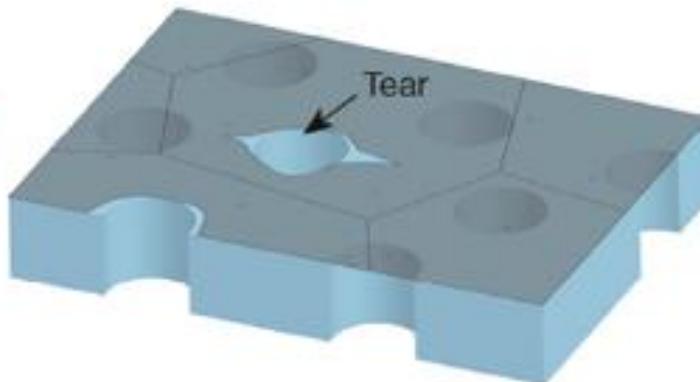


# Key Challenges: Stability and Pore Creation

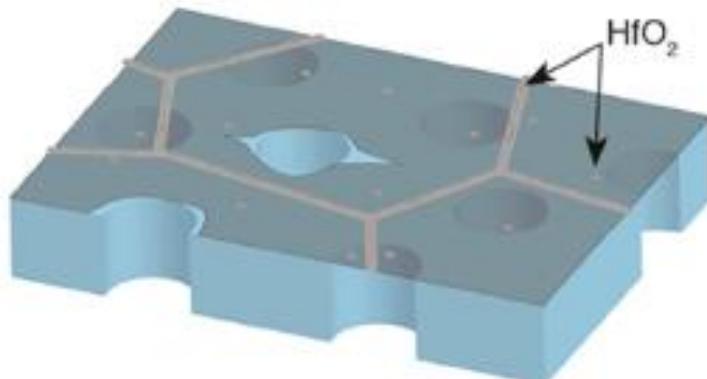
A1: CVD graphene on copper



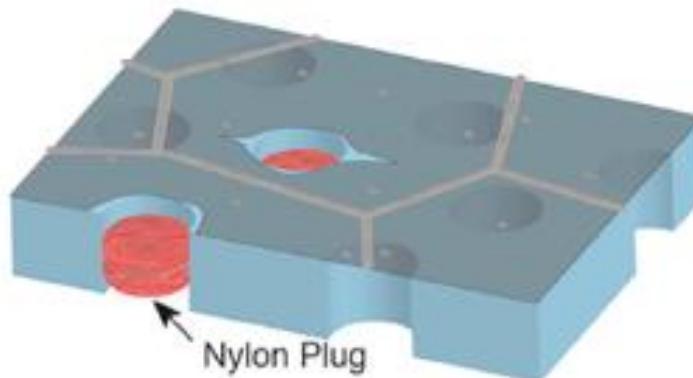
2: Transfer to PCTE membrane



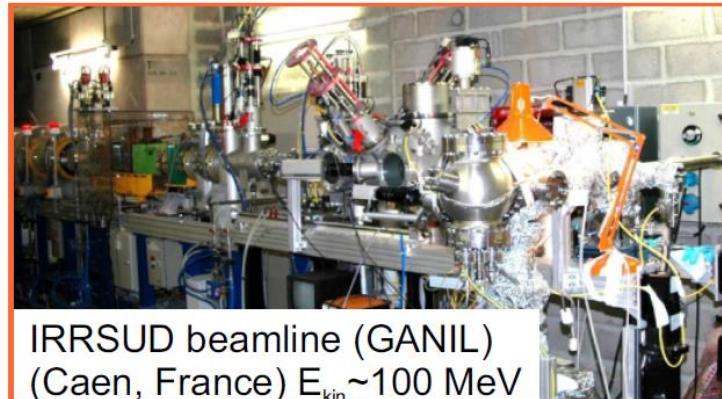
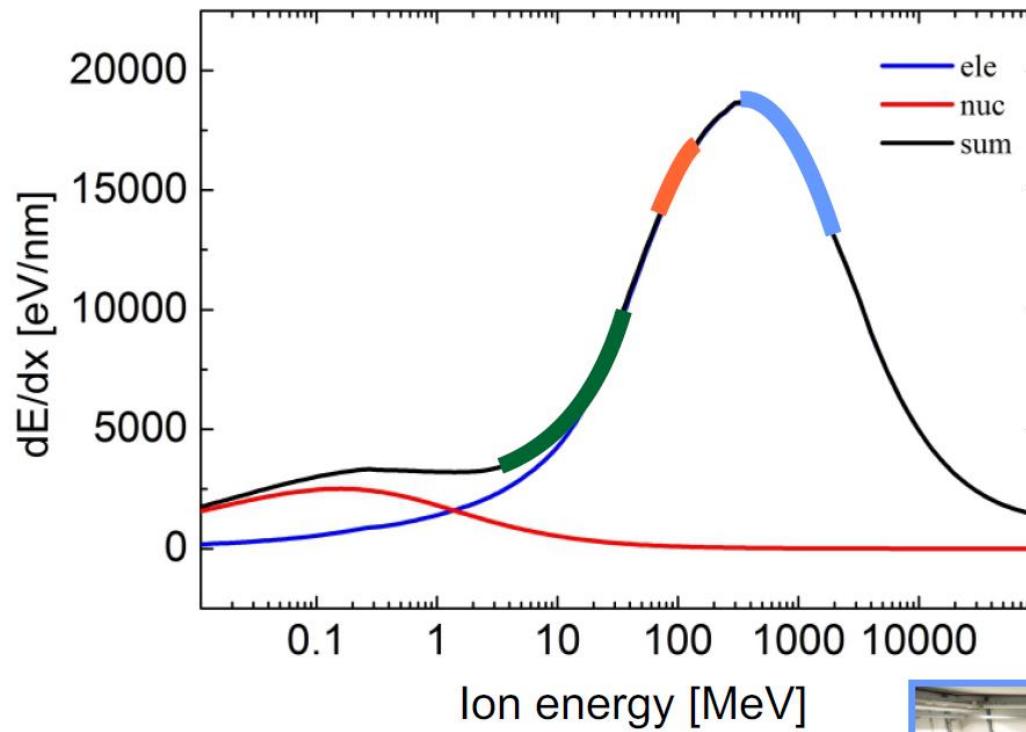
3: Atomic layer deposition of  $\text{HfO}_2$

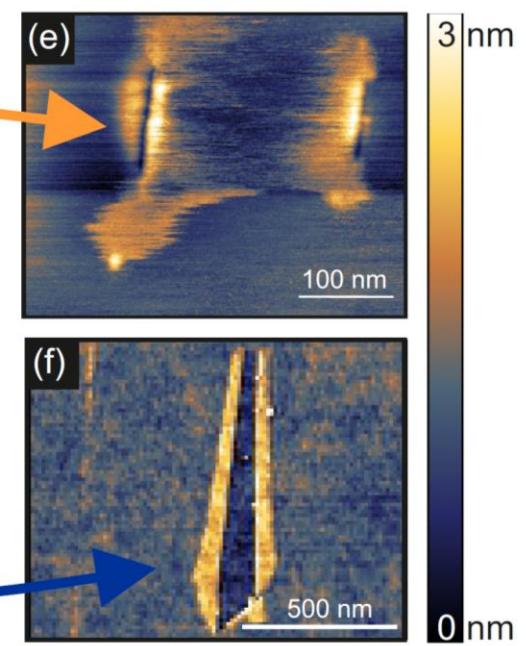
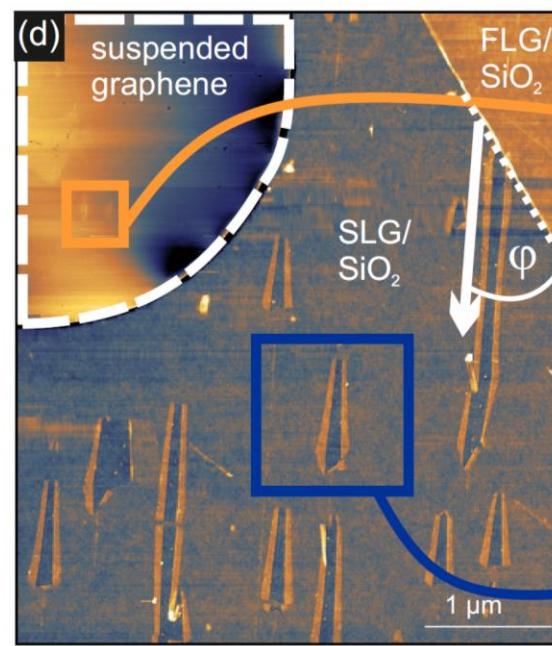
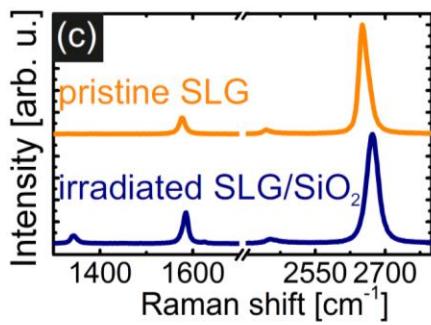
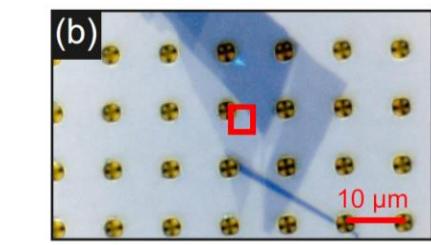
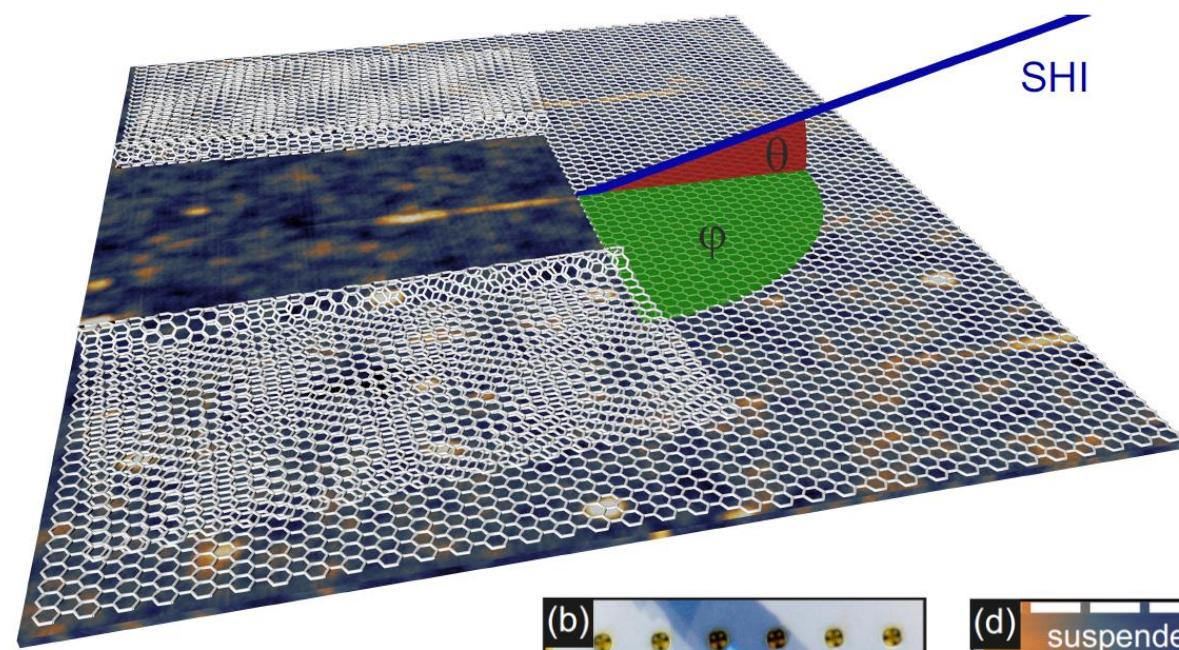


4: Interfacial polymerization (IP) of nylon 6,6

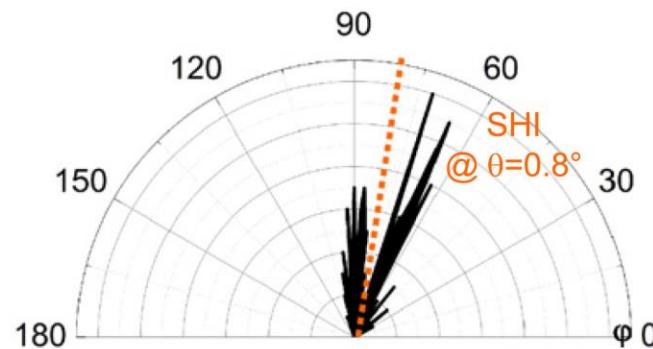
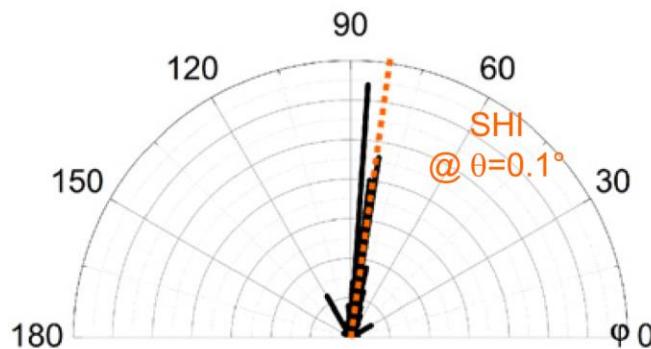
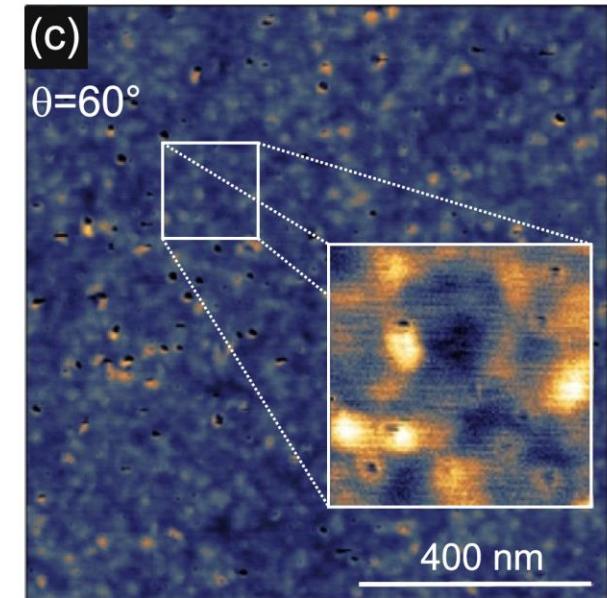
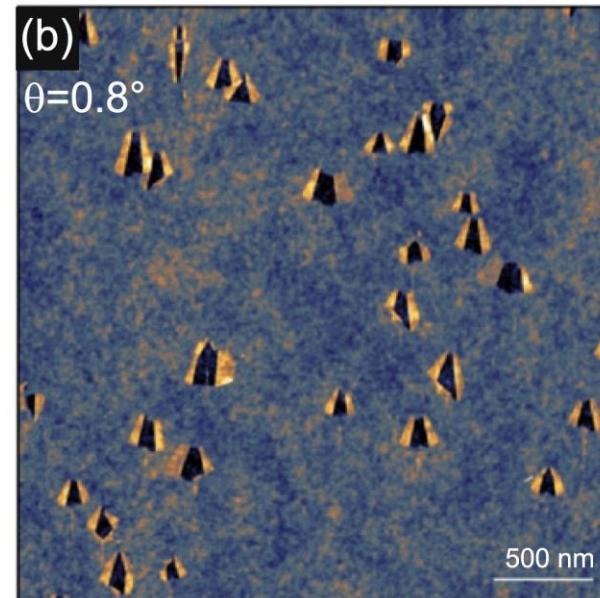
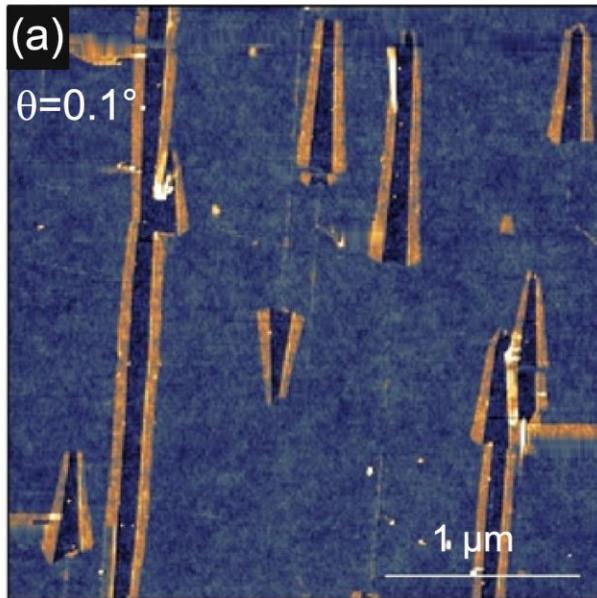


# Scientific Background: Swift Heavy Ions Interacting with ...

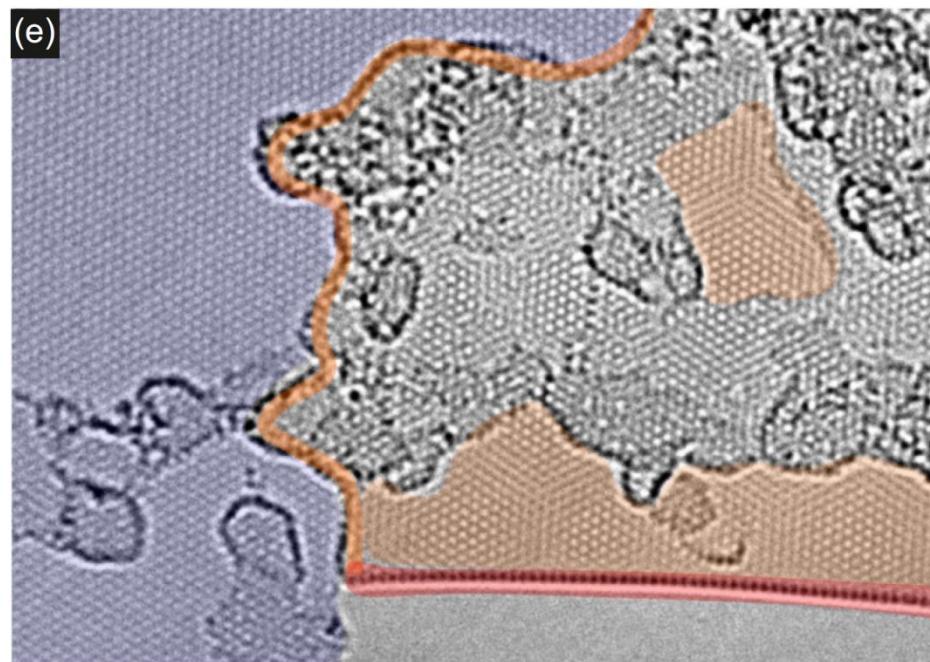
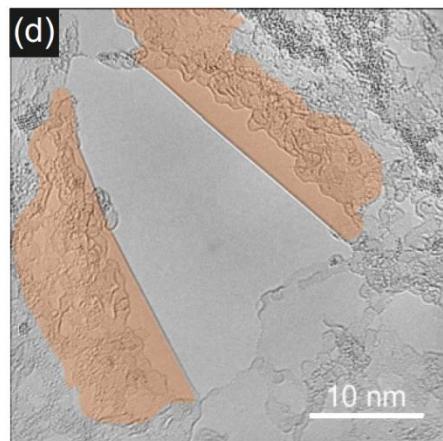
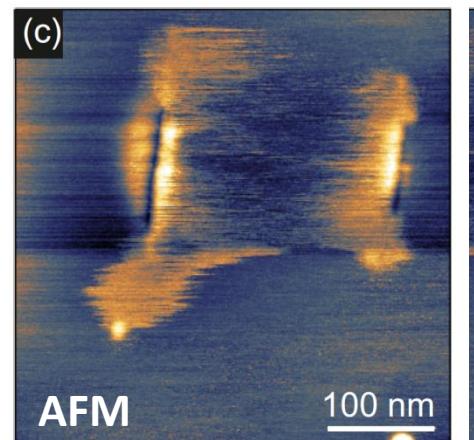
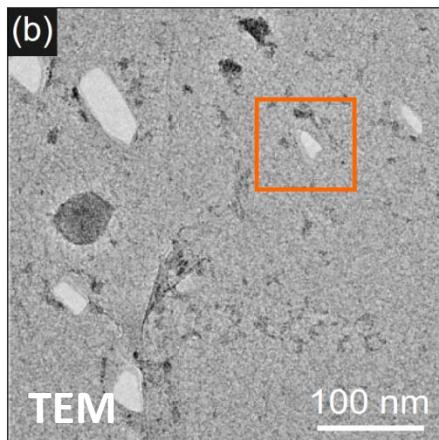




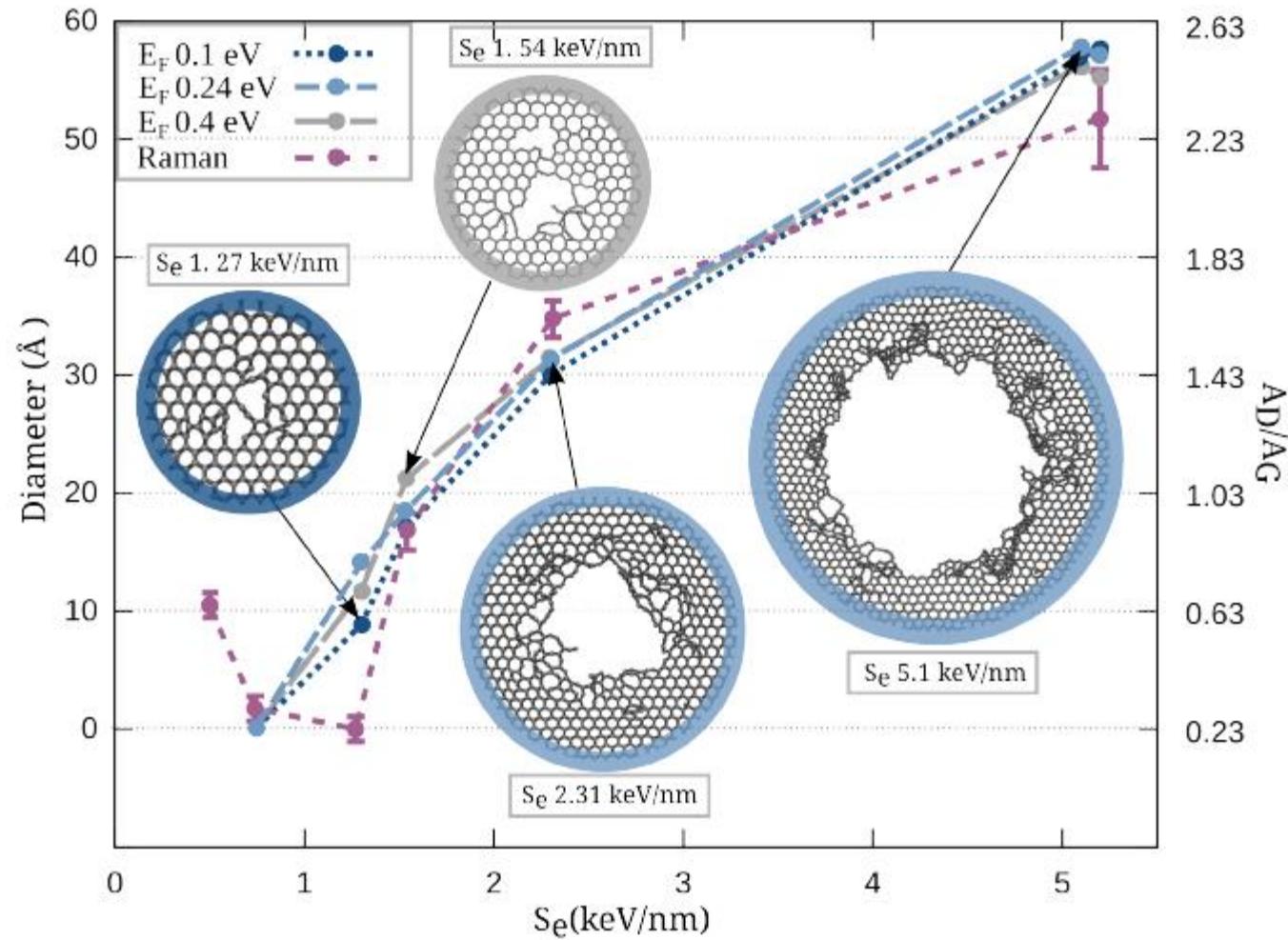
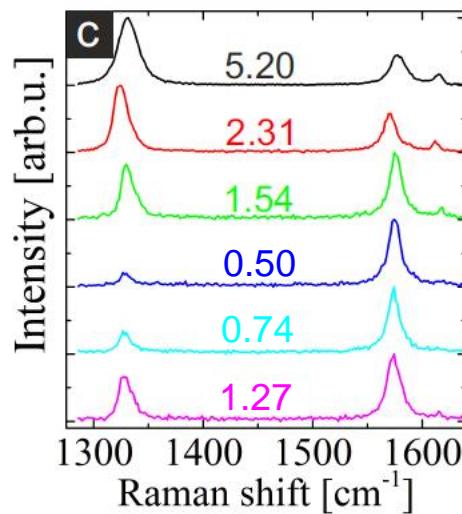
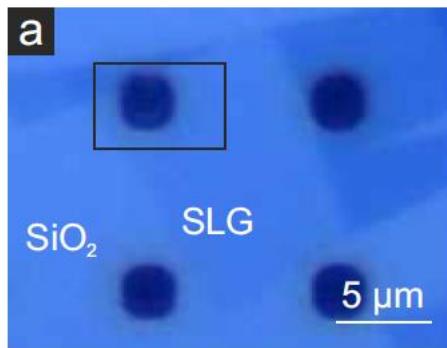
# Fabricating Synthetic Pores in Graphene with SHI

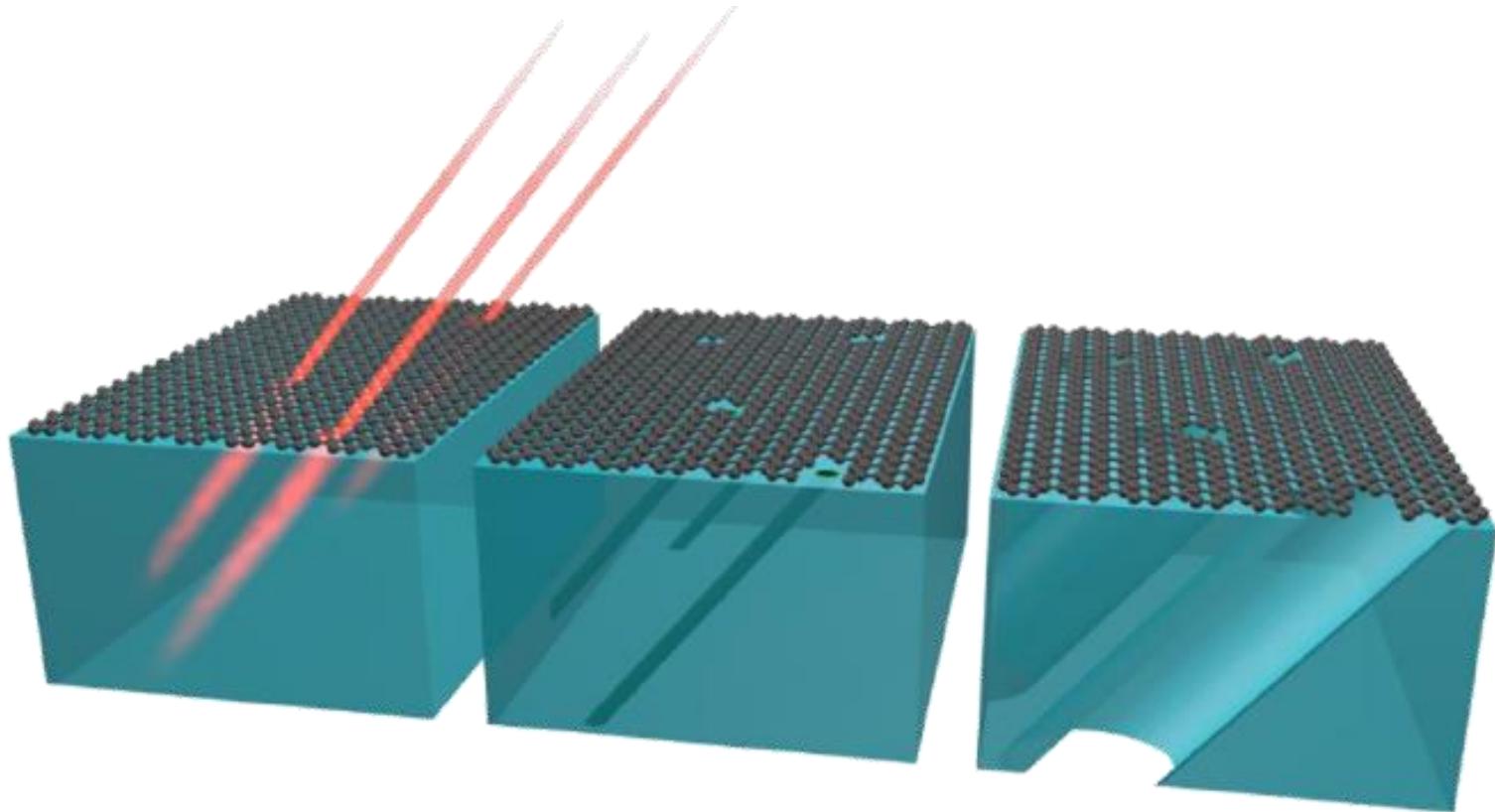


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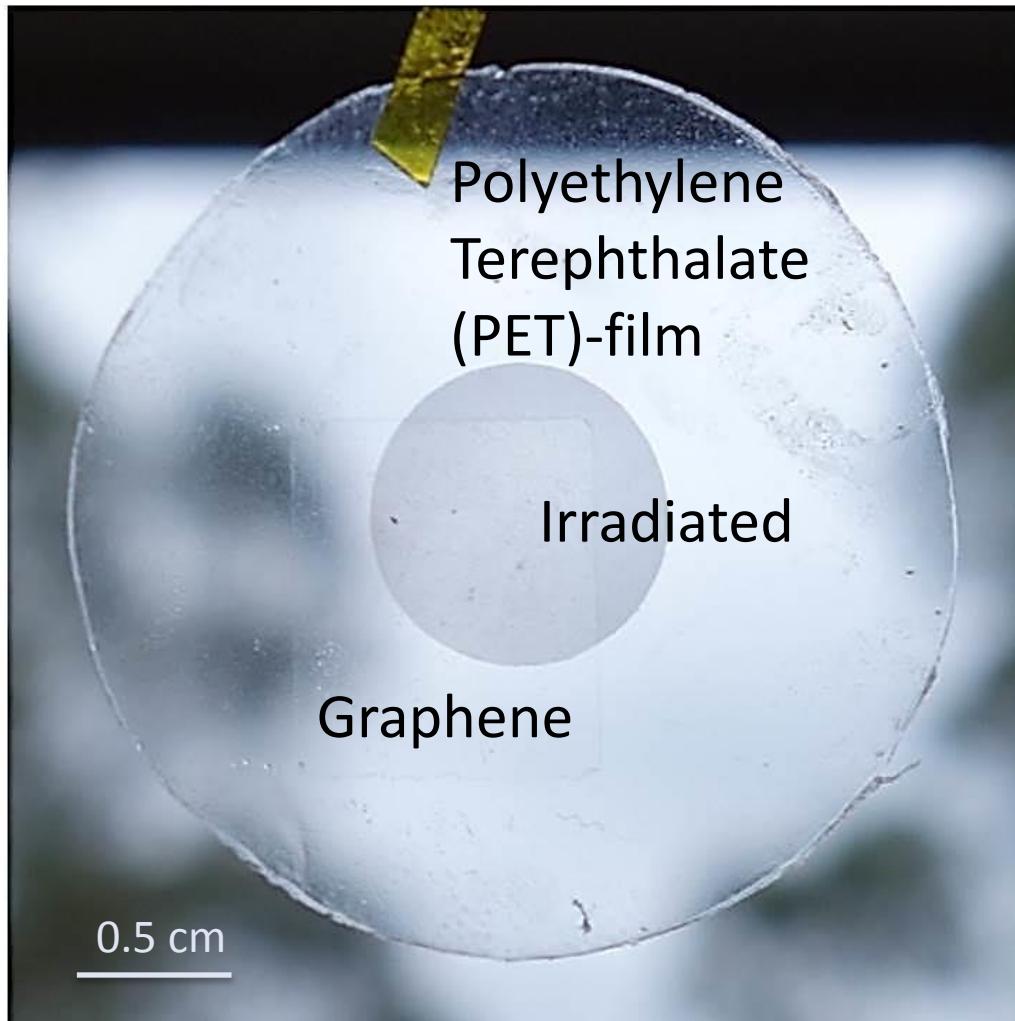
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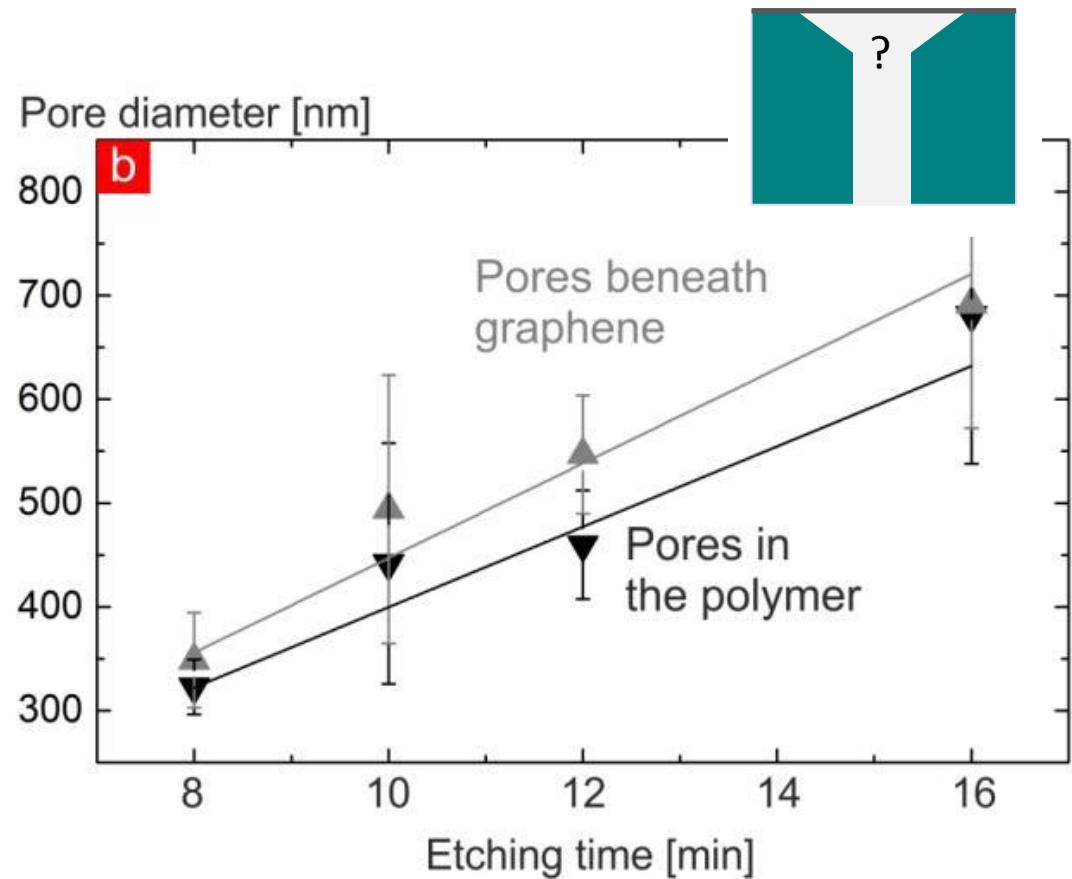
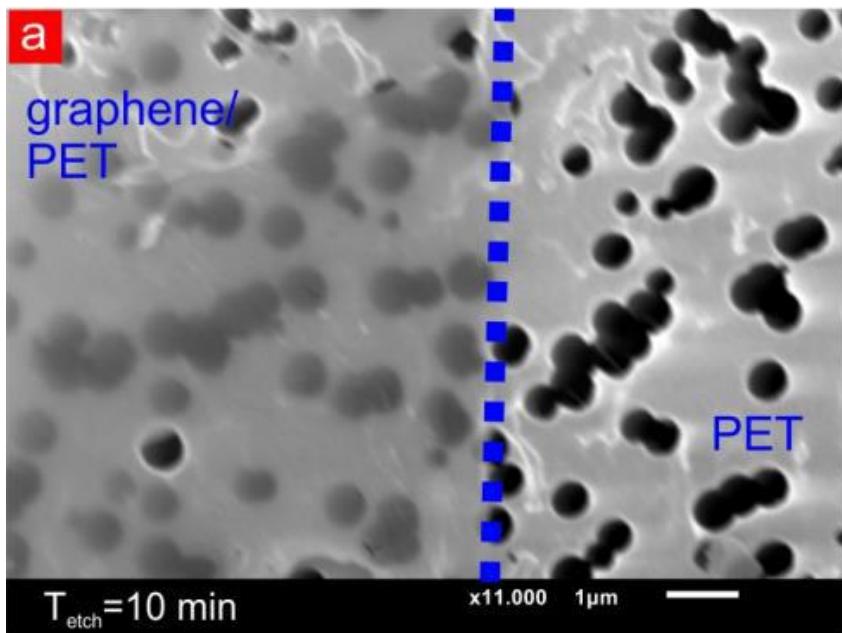


- Robust composite
- Aligned pores by perforation with SHI and subsequent etching
- Assessing separation performance
- Understanding of relevant mechanisms

# Towards Ultrafiltration-Membranes



# Towards Ultrafiltration-Membranes



# Consortium Partners & their Roles

**Graphene Composites**  
M. Schleberger, L. Madauß  
UDE, Germany



**Ultrafiltration**  
M. Ulbricht, J. Schuhmacher  
UDE, Germany



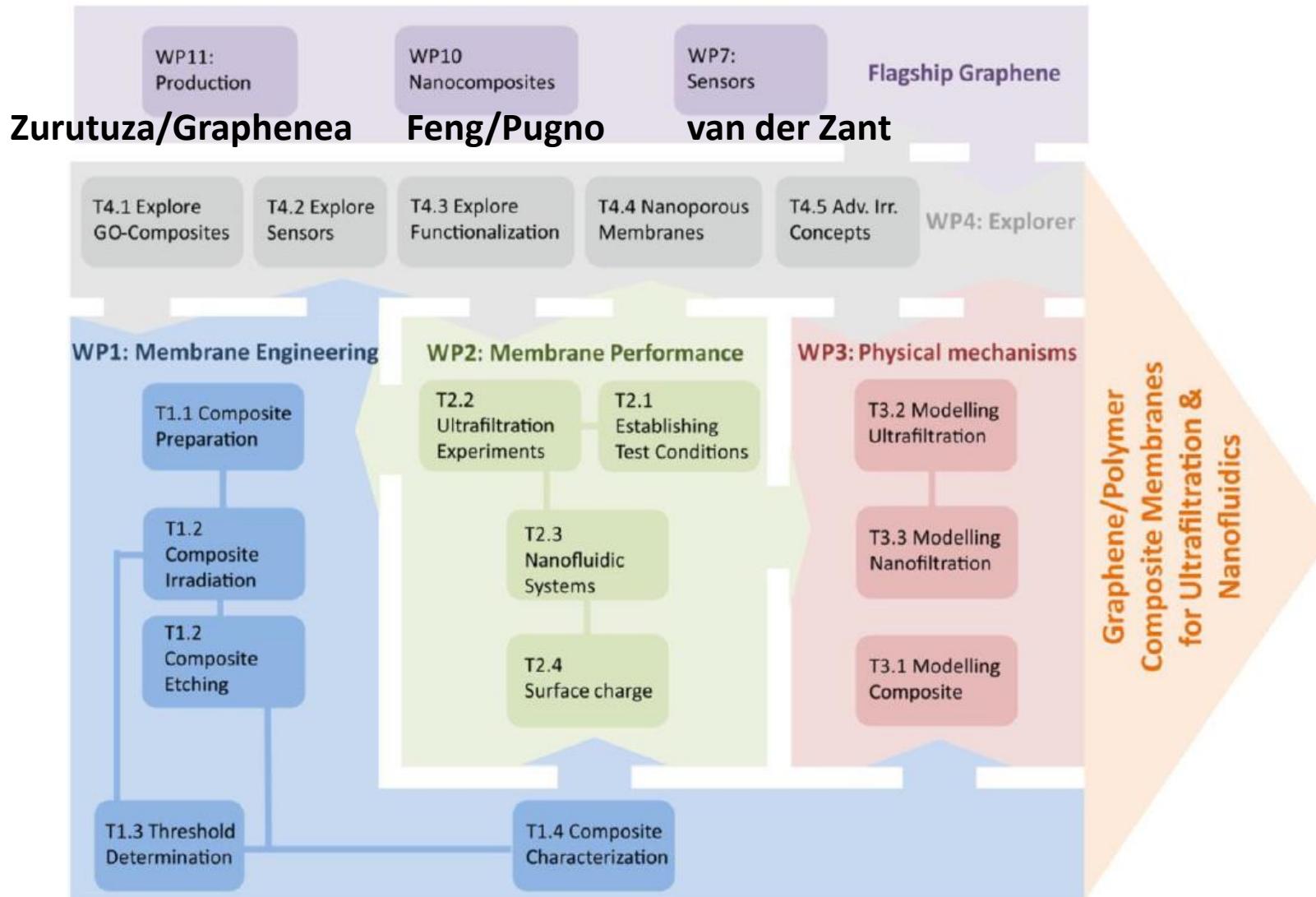
**Nanofluidics**  
M. Gosh, R. Lammertink,  
U Twente, Netherlands



**Irradiation**  
H. Lebius ENSICAEN, France  
M. Karlusic RBI, Croatia



# Interactions with the Flagship Core Projects



# Timing of Workpackages

Start: 1.2.2016, Kick-off meeting today



Milestones

M1: Robust graphene/polymer-composite

M2: Lab-scale prototypes of a graphene-polymer composite membranes for ultrafiltration and nanofluidic systems

M3: Design concepts for various graphene-based composite membranes for ultrafiltration and nanofluidics

# Communication Platform & Website

The screenshot displays the BSCW (Bibliothek und System für Computer-Wissenschaften) communication platform interface. The top navigation bar includes links for Portal, Logout, and various system icons. The main workspace is organized into several panels:

- Navigator (00\_NU-TEGRAM)**: Shows a tree view of the workspace structure with nodes for Portal, Group Calendar, Contact List, Inbox for E-Mail Upload, Project Stuff, and Template Folder.
- Calendar (Group Calendar)**: A calendar for April 2016, showing events like "FLAG-ERA Meeting and Kick-off" on April 13, 2016.
- Data (Data)**: Lists files such as Irradiations, Samples, and SAXS 2016.
- Literature (Literature)**: Lists documents including Blister Test Graphene 1, Blister Test Graphene 2, and Etching conditions for various polymers.
- Info (00\_NU-TEGRAM)**: Provides details about the workspace, showing it has 6 objects and no disk quota.
- Microblog (00\_NU-TEGRAM)**: A social media-like module where users can share with members of the workspace.
- Search (00\_NU-TEGRAM)**: A search bar for the workspace.
- Folder (00\_NU-TEGRAM)**: Lists workspace folders and their last modified dates.
- Events (00\_NU-TEGRAM)**: Displays a message stating "There are no events to display."