

**Dr. Adrian BEDA**  
**RESEARCH ENGINEER**

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**TECHNICAL SKILLS**

**Materials development:**

- **Bio-polymers:** phenolic resins, spheres, self-supported films
- **Hard carbon** based on bio-polymers and biomasses
- Self-rolled **carbon microtubes** from bio-polymers
- Organic-inorganic **hybrid lamellar materials**

**Synthesis methods:**

- **Liquid routes:** polymerization, sol-gel, impregnation
- **Carbonization** by pyrolysis, hydrothermal process and Joule effect
- Preparation of **carbon electrodes** using the "doctor blade" technique
- **Organic electrolytes** preparation for batteries

**Characterization techniques:**

- **Physico-chemical:** Temperature programmed desorption coupled with mass spectrometry (**TPD-MS**), Thermogravimetric analysis (**TGA**), X-ray diffraction (**XRD**), Fourier transform infrared spectroscopy (**FTIR**), **Raman** spectroscopy, Differential scanning calorimetry (**DSC**), Gas **adsorption** (N<sub>2</sub>/CO<sub>2</sub>/O<sub>2</sub>/H<sub>2</sub>), Scanning electron microscopy (**SEM**), Energy-dispersive X-ray spectroscopy (**EDX**), Helium pycnometry, Wettability and contact angle measurement
- **Electrochemical:** Cyclic voltammetry, Galvanostatic cycling with potential limitation

**TRANSVERSAL SKILLS**

- **Mass spectrometer** source **maintenance** and **TPD-MS calibration**
- Maintenance of high-temperature heat treatment furnaces (up to 1600 °C)
- **Training and assistance** on high temperature furnaces, synthesis of biopolymers, self-standing films and carbonaceous materials
- **Battery assembly** (Swagelok cells)
- Manipulations in an **isolated environment** (low levels of O<sub>2</sub> and H<sub>2</sub>O)

**OPERATIONAL SKILLS**

- Material optimization / development
- Anticipation / experimental planning
- Analysis and advice of results
- Writing of scientific reports / articles
- M2 internship supervision (2020)
- Revision of scientific articles
- Collaborative teamwork
- Collaboration in transversal projects
- English (C1), French (B2), Romanian (native)
- Microsoft Office Programs
- Data processing and analysis (Origin)
- Bibliographic data management (Zotero)
- Processing of adsorption data (MicroActive and SAIEUS)
- Processing of SEM / TEM images (ImageJ)
- X-ray powder diffraction data processing (DIFFRAC.EVA)
- TPD-MS Data Processing (Visual Basic)
- Electrochemical data processing (EC-lab<sup>®</sup>)

**PROFESSIONAL EXPERIENCE**

**2020-present:** **Research engineer**, Carbon and hybrid Materials Group, CNRS, Mulhouse Materials Science Institute (IS2M).

**2019-2020:** **Research engineer**, CNRS, Mulhouse Materials Science Institute (IS2M)

**Mission:** "Na ion materials as essential components to manufacture robust battery cells for non-automotive applications". Project NAIMA, **European Union's Horizon 2020** (H2020)

- 2019-2020:** **Project collaborator:** "Conventional and unconventional methods of synthesis and characterization of carbonaceous materials doped with metallic nanoparticles". Bilateral project **France – Romania**, PHC-Brancusi
- 2016-2019:** **PhD:** "Development of hard carbons eco-designed for Na-ion batteries", IS2M and Toulouse Interuniversity Center of Materials Research and Engineering (CIRIMAT)
- 2017-2019:** **Project collaborator:** "Controlled chemical-vapor deposition of carbon microstructures by microreactor designed by self-rolling approach". Bilateral project **France –Japan**, CNRS-JSPS.
- 2016:** **M2 Internship (6 months):** "Photoclay: Photochemistry and clays for green chemistry", Laboratory of Macromolecular Photochemistry and Engineering (LPIM) and IS2M
- 2015-2016:** **M1 Internship (7 months):** "Removal of Orange II sodium salt from aqueous solution using nanoscale iron kaolinite-supported", University of Aveiro, (Portugal)
- 2015:** **Training (3 months):** "Surface Chemistry and Clay Minerals Chemistry", University of Ottawa, Ottawa (Canada)
- 2012-2013:** **L3 Internship (6 months):** "The study of Fenton oxidation of textile Remazol 3R and Remazol Rose RB dyes into water systems", Technical University "Gheorghe Asachi" - Iasi, (Romania)

## SCIENTIFIC TRACK

1. **A. Beda et al.**, [Hard carbon porosity revealed by the adsorption of multiple gas probe molecules \(N<sub>2</sub>, Ar, CO<sub>2</sub>, O<sub>2</sub> and H<sub>2</sub>\)](#), J Mater Chem A (2021), 9, 937–943
  2. **A. Beda et al.**, [Hard carbon key properties allow for the achievement of high Coulombic efficiency and high volumetric capacity in Na-ion batteries](#), J Mater Chem A (2021), 9, 1743–1758
  3. **A. Beda et al.**, [Impact of biomass inorganic impurities on hard carbon properties and performance in Na-ion batteries](#), Sustainable Materials and Technologies 26 (2020) e00227
  4. **A. Beda et al.**, [Self-supported binder-free hard carbon electrodes for sodium-ion batteries: insights into their sodium storage mechanisms](#), J Mater Chem A, (2020), 8, 5558–5571
  5. **A. Beda et al.**, [Carbon microtubes derived from self-rolled chitosan acetate films and graphitized by joule heating](#), J. Mater. Sci., (2019), 54, 11345–11356
  6. **A. Beda et al.**, [Hard carbons derived from green phenolic resins for Na-ion batteries](#), Carbon (2018), 139, 248-257
- **1 French patent and 1 international patent filed; 1 book chapter**
  - **9 oral presentations and 3 by poster** in national and international conferences

## AWARDS

- **Best poster**, 14<sup>th</sup> annual colloquium of the French Clays Group (GFA), Poitiers, France (2016)
- **Erasmus Mundus Scholarship**, International Master in Advanced Clay Science (IMACS), University of Poitiers, France (2014)
- **Best oral presentation**, Student scientific session, Technical University "Gheorghe Asachi" - Iasi, Romania (2013)

## EDUCATION

- 2016-2019:** **PhD in Materials Chemistry:** University of Strasbourg, University of Haute-Alsace, Mulhouse, France
- 2014-2016:** **Master degree in clay science:** International Master in Advanced Clay Science (IMACS) University of Poitiers, Poitiers, France
- 2009-2013:** **Bachelor degree** in Engineering and Environmental Protection in Industry, Technical University "Gheorghe Asachi", Iasi, Romania