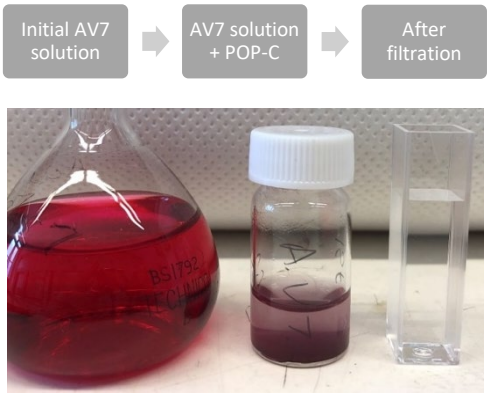
Conjugated microporous polymers for the removal of toxic elements from water

About the project or challenge area: Water pollution is a serious environmental issue, impacting especially those living in informal settlements. Many different substances are responsible for polluting water including organic pollutants such as: azo dyes, pharmaceuticals, solvents and inorganic pollutants such as heavy metals. Conjugated microporous polymers (CMPs) are a class of porous materials that possess high surface areas, controlled pore sizes and functionality. These properties make them suitable for a wide range of applications, including water purification. Thus far, CMPs synthesized within the Faul group have had success in removing dyes (acid violet 7, congo red and methylene blue) and heavy metals (manganese) from water however, there is room to explore this topic further. This project will focus on the exploration of the water purification properties of existing CMPs synthesized with the aim to remove toxic elements. Additionally, you will optimize and modify the synthetic process as well as having the opportunity to create novel CMPs of your own.



Why choose this opportunity? The initial focus of your project will be on CMPs, characterizing their properties and exploring their applications. This will provide an excellent platform to learn about the design of functional materials and their practical applications in the water purification process. Additionally, you will be able to meet the team and get acquainted with the laboratory. The secondary focus will be on synthesizing novel CMPs to target specific toxic materials, giving you experience in synthetic techniques as well as characterisation. Your work in this area can make a real impact on global challenges, such producing low-cost water filters for use in informal settlements, thus reducing risks of people drinking contaminated water. You will develop and increase your expertise in applied materials chemistry, whilst becoming familiar with the fundamentals of polymer science, surface chemistry and water purification. Furthermore, this project will require your collaboration with other members across other research groups and Universities (both home and international), thus improving your teamwork and networking skills. You will also develop a range of transferable skills, including presentation, scientific writing, and project and time management. Finally, you will be interacting with students from all over the world, learning from their culture and skills, adding to your professional and personal development.

Full training will be provided for all aspects of this project. You will be embedded in the large, international and dynamic Faul Research Group, who will provide support. In addition, you will be assigned a student mentor for the duration of your project, who will provide extra support and help you to identify any additional training needs or opportunities.

About you: Ideally you will already have skills and knowledge in synthetic chemistry, analytical methods (specifically UV-Vis), and polymer science, teamwork and time management.

Bench fees: A bench fee of £10,000 is required.

How to apply: Applications are accepted throughout the Academic Year, and you should complete the online application form for Chemistry (MSc by Research).

Supervisor: Your supervisor for this project will be Charl Faul, Professor Chemistry in the School of Chemistry. Please see faulresearchgroup.com and @FaulResearch for further details. You can contact him at +44 (0) 117 954 6321 or email charl.faul@bristol.ac.uk

Find out more about your prospective research program: These articles explain the general background CMPs as water purification motifs:

- From the Faul Research Group: "Macrocyclic Amine-Linked Oligocarbazole Hollow Microspheres: Facile Synthesis and Efficient Lead Sorbents" *Macrom. Rapid. Commun.*, **2014**, *35*, 1833
- A polycationic covalent organic framework: a robust adsorbent for anionic dye pollutant DOI: 10.1039/c6py00281a