Tools of Science

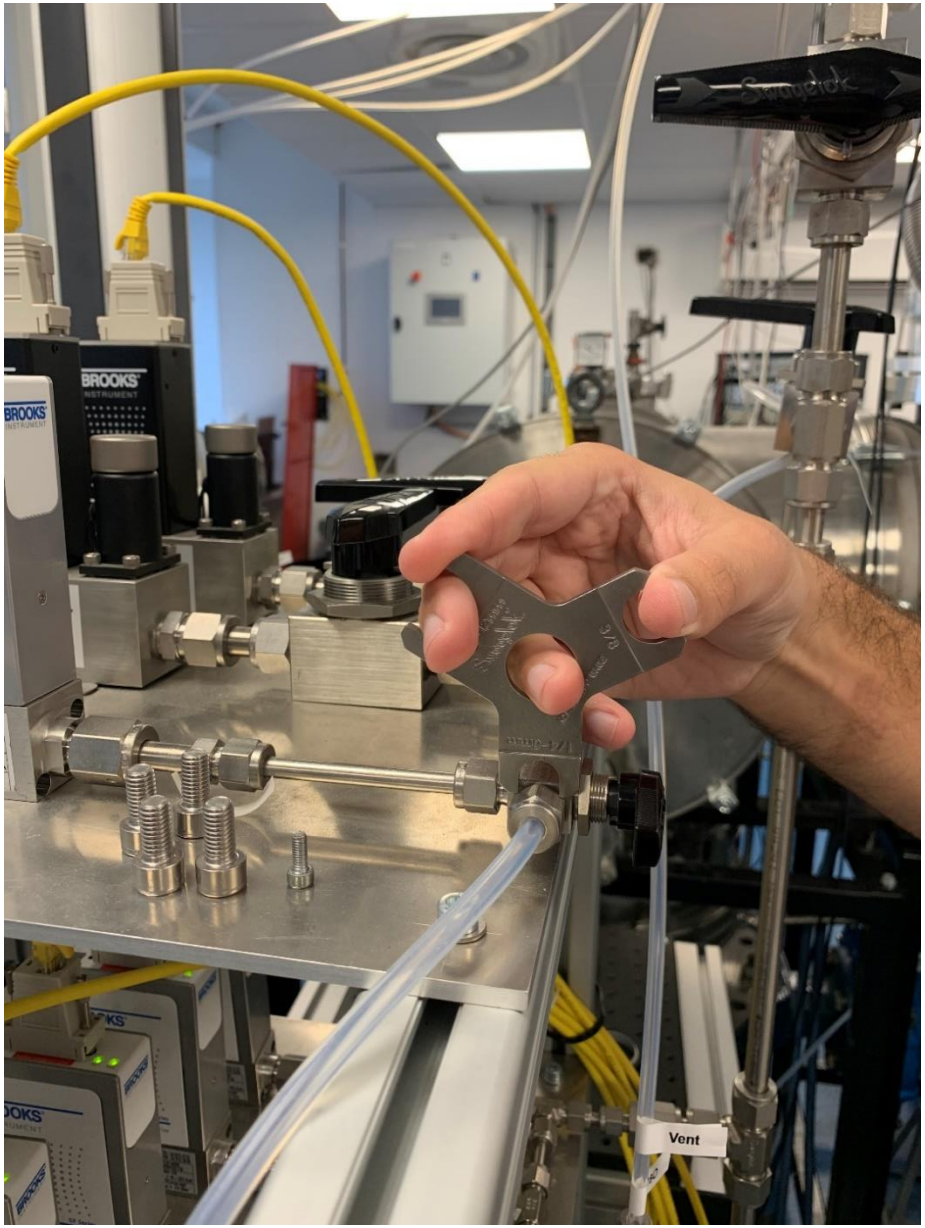
When picturing the day-to-day instruments used by a scientist, we usually think of a lab coat or a Petri dish. But depending on the field and the project, there is so much more!

Discover BIENVENÜE fellows' favourite, most bizarre or most-used items in their everyday lab life.

The monodisperse Droplet Spray Dryer

“Spray drying is generally used to dry the material from a solution or emulsion by spraying and using gaseous hot drying medium. Similarly, a monodisperse droplet spray dryer involves the same mechanism as a spray dryer, but produces identical volume droplets. In fact, many functional materials have a high requirement on the homogeneity of powders' characteristics. Thus, our laboratory uses a monodisperse spray dryer to produce a series of small droplets containing the same volume (e.g., milk powders). Now I am using a monodisperse droplet spray dryer to produce identical microcapsules containing bioactive compounds, which can be further used in the development of smart/functional food products”.

Dr Kandi Sridhar,
Food chemist, working at the STLO laboratory,
Institut Agro Rennes-Angers, in Rennes



The Shuriken

“In our physical chemistry lab, we usually need to do more than science, from bricolage to plumbing and electricity. But our plumber is slightly different from normal, it is for gases under pressure or vacuum. We use special plastic tubes and fittings to build our connections, and then one of the most important steps is to make sure there are no leaks. For this, we use the “shuriken”, a gas connections gap inspection gauge which ensures that, if the distance between two pieces is short enough, no leaks will appear. “

Dr Alberto Macario Farto,
a physical chemist working at the IPR laboratory,
Université de Rennes 1, in Rennes

The mesopelagic trawl

“The mesopelagic trawl net is commonly used to collect organisms including small fishes, crustaceans and squids, inhabiting the mesopelagic zone. The trawl net used on board the Research Vessel Marion Dufresne during my postdoc, has a length of 44 m, and 30 mm and 4 mm mesh nettings at the front and codend, respectively, targeting organisms from 2 to 20 cm in size. It is towed at a ship speed of 1.2 knots for approximately 30 minutes. Coupled with acoustic data, the net allows us to determine species presence and biomass.“

Dr Pavanee Annasawmy,
an oceanographer working at the LOPS laboratory, Université de Bretagne-Occidentale in Plouzané

The Next Unit Computing

“This little NUC has the size of a debit card and can be used as a personal computer (PC) once attached to an external monitor, keyboard and mouse. It can be loaded nowadays with advanced hexacore 10th gen Intel chips and up to 64 Gb of RAM memory, thus turning it from a simple PC into a very capable computing station for entry and mid-level difficulty quantum-mechanical calculations.
I personally use this little monster whenever necessary to test inputs for quantum mechanical simulations in order to make sure they unfold as intended before deploying them on a more advanced high-performance computing cluster.“

Dr Dumitru-Claudiu Sergentu,
A computational chemist joining the ISCR laboratory, Université de Rennes 1, in Rennes

The HT/HP Apparatus

A

B

C

“I use this apparatus to cultivate piezophiles (Microbes which love to grow and thrive at high pressures) at high pressure (HP) and temperature (HT).
For this purpose, I introduce cultures of the piezophiles in small culture tubes into part (a). After screwing the lids of the incubators tightly, the pressure is adjusted by b) the pressure pump which I use to pump water inside to create the desired pressure indicated by the manometer. Then I connect the wires coming from behind part (a) with part (c), the controller computer for controlling the temperature and adjusting the temperature, finally starting the whole system.”

Dr Trinetra Mukherjee,
a microbiologist working at the BEEP laboratory,
Université de Bretagne-Occidentale, in Plouzané

The Rotary Evaporator

“The boiling point of solvents largely depends on the pressure surrounding it. The lower the pressure, the lower the boiling point of the solvent. You can observe this phenomenon in the mountains, where the pressure is lower and the water boils at a temperature below 100°C.

In order to achieve a similar result - lowering the boiling point, and thus easier evaporation of the solvent, chemists use a rotary evaporator, which includes an important element - a vacuum pump (A).

To make the evaporation process even more efficient, the flask with the solvent is rotated and heated in a water bath (B).“

Dr Kamil Kupietz,
a chemist joining the ISCR laboratory,
Université de Rennes 1, in Rennes

A

B

The ChipIr instrument for irradiation of microelectronics

“At Rutherford Appleton laboratory in the UK, I expose computing devices to a flux of accelerated neutrons. When the neutrons hit the chip, they can generate errors in the programs they are executing.
Knowing the error impact on the program, we can design error tolerance techniques to make safety-critical applications such as self-driving cars more robust.
The experiments are done inside a blockhouse, built with enormous concrete blocks (B) to protect the scientists from radiation. The computing devices can only be accessed through a large concrete door when the beam is shutdown.“

Dr Fernando Fernandes dos Santos,
Computer scientist, working at the IRISA lab,
Inria, in Rennes

The high pressure and temperature reactor

“I present you my high pressure and temperature reactor! In this equipment, hydrogenation of vegetable oils is carried out, in order to obtain long chain hydrocarbons that can be used as fuels. These biofuels are an efficient and environmentally friendly alternative to reduce the consumption of fossil fuels.

The reactor is a safe device that allows reaching high H2 pressure and temperature conditions. In particular, my experimental conditions are 40 bar and 300°C. “

Dr Marisa Navas,
a chemist joining the ISCR laboratory,
Université de Rennes 1, in Rennes

About

This short exhibition is created for the 2022 Edition of European Researchers' Night, and coordinated by the BIENVENÜE project team.

Région Bretagne is co-financing, within the BIENVENÜE project, 75 highly-talented international researchers, in order to reinforce human potential of Breton research, to increase iths visibility and attractivity in key identified excellence and innovation areas.

Learn more about the BIENVENÜE fellows on
https://msca-bienvenue.bretagne.bzh/

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