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## ARKEMA, THE CNRS, CLAUDE BERNARD LYON 1 UNIVERSITY AND CPE LYON ARE COMBINING THEIR EXPERTISE TO DESIGN THE BATTERIES OF THE FUTURE

**A more and more important portion of portable energy needs will soon be based on mobile energy storage devices, such as lithium-ion batteries. Arkema, the CNRS [Centre National de la Recherche Scientifique (French National Centre for Scientific Research)], Lyon 1 University, and CPE Lyon [École Supérieure de Chimie, Physique, Électronique de Lyon (Grande École of Chemistry, Physics, and Electronics)] have created iHub Poly-9. This joint laboratory will be dedicated to the design of new high-performance materials based on fluoropolymers, which will be used in future generations of batteries.**

With electric cars, smartphones, and laptops, the need for mobile energy storage devices continues to grow. This demand is principally met by lithium-ion batteries. They consist of two electrodes that do not touch each other due to the presence of a separator, all of which are bathed in an electrolyte solution. Different fluoropolymers — a family of molecules to which KYNAR® PVDF belongs — offer excellent cost-performance ratios as cathode binders and separator coatings to improve their performance: energy density, power, storage capacity, lifespan, reliability, etc

The catalysis, polymerization, processing, and materials laboratory has been conducting research on these polymers for more than thirty years, which has led to this alliance between Arkema, the CNRS, Claude Bernard Lyon 1 University, and CPE Lyon, within a new joint laboratory project: iHub Poly-9. This laboratory works in partnership with ARKEMA's newly created battery center of excellence on the Pierre Bénite site.

*"I am delighted with this partnership with Arkema, which is part of a long history of cooperation. We are pursuing a constant policy of developing joint laboratories with companies of all sizes, as confirmed by the more than 200 joint laboratories already in existence. This ambitious form of collaboration between business and academia is based on fundamental research to provide a response to major industrial challenges,"* said Antoine Petit, President and CEO of CNRS.

*"This laboratory is another joint initiative in the long-standing collaboration between Arkema and the CNRS. It is a perfect illustration of Arkema's ongoing commitment to open innovation and partnerships with the academic world. This enables us to draw on the best expertise to develop sustainable, high-performance materials in strategic areas such as batteries and hydrogen,"* said Armand Ajdari, Vice President, Research and Development at Arkema.

The scientists involved are particularly interested in polyvinylidene difluoride (PVDF) and in its copolymers. This family of polymers is extremely stable both chemically and electrochemically. Their synthesis, which takes place in a medium dispersed in water, requires high pressures that can exceed 100 bars, an expertise of which the CP2M benefits from, as it has reactors capable of reaching these pressures in complete safety.

Collaboration with Arkema is primarily exemplified by the holding of five doctorates that will be studying the synthesis and processing of fluoropolymers intended for the field of energy. This includes a thesis financed by the Auvergne-Rhône-Alpes region, and three CIFRE [Convention Industrielle de Formation par la REcherche (Industrial Research Training Partnership)] theses funded by the company, as well as the purchase of equipment for a 50-m<sup>2</sup> laboratory dedicated exclusively to iHub Poly-9 within the premises of CP2M.

Building on its unique set of expertise in materials science, **Arkema** offers a portfolio of first-class technologies to address ever-growing demand for new and sustainable materials. With the ambition to become in 2024 a pure player in Specialty Materials, the Group is structured into 3 complementary, resilient and highly innovative segments dedicated to Specialty Materials -Adhesive Solutions, Advanced Materials, and Coating Solutions- accounting for some 85.5% of Group sales in 2021, and a well-positioned and competitive Intermediates segment. Arkema offers cutting-edge technological solutions to meet the challenges of, among other things, new energies, access to water, recycling, urbanization and mobility, and fosters a permanent dialogue with all its stakeholders. The Group reported sales of around €9.5 billion in 2021, and operates in some 55 countries with 20,200 employees worldwide.

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