

ComInCell Launches: A European Doctoral Network to Train the Next Generation of Cell Scientists

Positions in the Poolman group (Groningen, NL):

PhD vacancy 1: Compartmentalization and spatial distribution of reaction networks in synthetic cells. We will systematically analyze and exploit the properties of biomolecular condensates to enhance the efficiency of reaction networks for fuel supply and building block synthesis.

PhD vacancy 2: Membrane expansion with condensates. We will combine active membrane expansion with the expression of synthetic RNA condensates to engineer complex re-structuring events such as engulfment, exocytosis, membrane rupture and/or fission.

A cell is the most basic unit of life of performing essential functions like reproduction, nutrient conversion into metabolic energy, and growth. But "basic" does not mean simple. Cells are intricate assemblies of lipids, proteins, nucleic acids, carbohydrates, and water, organized into dynamic structures of membranes and specialized organelles. And while small, cells are far from unimportant: they constantly adapt to external stimuli, and when they malfunction, the consequences can be profound—leading to uncontrolled growth, as in cancer, or premature death, as in neurodegenerative diseases. Today, a new doctoral network funded by the European Union's Marie Skłodowska-Curie Actions and cofounded by the UK Guarantee Scheme launches with an ambitious goal: training the next generation of biomedical and biotechnology researchers who will uncover cellular mechanisms through cutting-edge synthetic replicas.

The project's full title is "Condensates at Membrane Scaffolds - Integrated Systems as Synthetic Cell Compartments," but, like many EU-funded initiatives, it goes by a much friendlier acronym: "ComInCell." The network brings together 14 Principal Investigators from 13 institutions across 9 countries, all focused on designing synthetic models that accurately mimic the behaviors of natural cells. Drawing on expertise in biophysics, nanotechnology, biochemistry, and bioengineering, researchers will design efficient, resource-conscious synthetic models that simulate biological processes. As ComInCell's name suggests, cells are studied as integrated systems, where each component constantly interacts and reshapes the others—such as *membranes* that provide internal scaffolding and membraneless droplets called biomolecular *condensates*. From London to Tel Aviv, the network strives for a significant impact not only on fundamental science but also on medical applications. A better grasp of cellular mechanisms helps trace the roots of numerous diseases. Furthermore, synthetic cells hold great promise as non-invasive drug carriers and innovative and sustainable testing tools for tailored therapeutic applications.

To accomplish these scientific goals, ComelInCell is equally dedicated to recruiting 17 graduate students and supporting their scientific and professional development with well-rounded training. True to their namesake, Marie-Curie projects promote international mobility and collaboration, integrating students into an interdisciplinary network. PhD candidates will participate in annual retreats and gain hands-on experience across 2-3 different labs, building connections with peers and mentors. Interdisciplinary workshops and lectures will equip students with diverse skill sets for synthetic cell development—emphasizing also sustainable and cost-effective methods. In ComelInCell, academia and industry join forces to provide long-term transferable skills. Alongside academic labs and seminars, students will gain practical experience at partner companies in biotechnology, software development, and analytical instrumentation. With a strong focus on research dissemination, they will even have the opportunity to work with the editorial teams of two top-tier scientific journals.

With ComelInCell's scientific and educational journey now officially underway, interested students have an exciting opportunity to explore and expand the frontiers of cell research.