



PARIMALDEVI Palanisamy

Technology Centre: Pharmaceutical Manufacturing Technology Centre
Academic Mentor: Dr. Vasanth Kumar
Company Partner: Innopharma Technology, Dublin
Company Mentor: Dr. Kiran Kumar

Dr. Parimaladevi received her Master's degree and Ph.D from Bharathiar University, India. Following her Ph.D, she worked as a postdoctoral fellow at Indian Institute of Technology Gandhinagar, India from 2017 to 2019, and as a Research Assistant at University of Limerick, Ireland in 2019. In 2020, she joined as a postdoctoral fellow at University of Antwerp, Belgium (in collaboration with Janssen Pharmaceutica, Beerse, Belgium) and did research on fabrication of microfluidic devices to study the phenomena of non-photochemical laser induced nucleation of active pharmaceutical ingredients (API). Her previous research area focuses on crystallization, co-crystallization, liquid-liquid phase separation, polymorphism, and crystal growth technology of API.

Dr. Vasanth Kumar

Dr. Vasanth Kumar is a Lecturer in Chemical Engineering in University of Limerick. He received his first PhD in Environmental Technology from Anna University and second PhD in Chemical and Biological Engineering from University of Porto. He has published more than 100 articles and has a h-index of 33 with >7400 citations. He has more than 16 years of research experience in crystal growth science, liquid phase adsorption, synthesis, gas storage and separations. He worked as one of lead researcher in several international/national level multidisciplinary projects in India, Portugal, Spain, Greece, UK, and Ireland that across several research themes that includes energy, pollution abatement, crystal growth science and molecular simulations. He was one of the 50 top cited authors in the world in the field of Colloid and Interface Science (2004-2007) and is in the top 2 per cent of the most-cited scientists in the database released by Stanford University (2020). He won several prestigious fellowships from different state agencies that includes Senior Research Fellowship (CSIR, India), Juan de la Ciera (MICINN, Spain), IAPP Marie Curie Individual fellowship (2013, European Commission) and IEF Marie Curie Fellowship (2014, European Commission). His current research interests include Process Analytical Technology, nucleation, crystal growth, gas storage/separation, carbon material synthesis, machine learning and material synthesis.

Dr. Kiran Kumar

Dr. Kiran Kumar is currently working as a Crystallization Scientist in the Innopharma Technology, Dublin. He earned PhD in Chemical Engineering from ICT-Mumbai, India. He has published more than 10 research articles in highly reputed journals with total 155 citations and h-index 6. He has experience in setting up and managing analytics and process lab as per the GMP environment. He is involved in developing analytical methods that are adhere to USP, EP and JP regulations, developing training material, SOP and documentation for crystallization, fluid bed granulation processes, dissolution apparatus and analytical equipment such as HPLC, UV. He has developed strong expertise in the production of pharmaceuticals in large scale.

Pharmaceutical Manufacturing Technology Centre (PMTC)

The Pharmaceutical Manufacturing Technology Centre (PMTC) is a leading industry informed research centre focused on developing advanced technology solutions for all stages of pharmaceutical manufacturing. The market-focused research delivers solutions to contemporary issues currently facing the pharmaceutical industry. The PMTC is hosted at the University of Limerick with core funding. Company engagement allows the PMTC to execute world-leading, industry relevant research in advanced technology solutions to address contemporary manufacturing issues across the pharmaceutical sector.

Innopharma Technology

Dublin based Innopharma Technology (established in 2009) is designing and developing Industry 4.0 manufacturing solutions which enable quick decision-making, reduce time-to-market, and support better outcomes. It also delivers smart, cost-effective, non-contact imaging technologies and PAT tools for manufacturing control in pharmaceutical, food/feed, and fine chemical industries. Innopharma Labs is one of only two Irish companies to receive funding from the EU's Horizon 2020 programme in 2018. Innopharma is currently adapting the SmartX platform for use on PAT enabled and instrumented crystallization reactor.

Parimala's project

“CRYSTASSEMB: Novel techniques for the production of API nanoparticles via self-assembling in supersaturated solutions”

Nanosizing of pharmaceuticals is the efficient drug delivery approach for the compounds showing poor solubility in water. This is commercially produced by top-down technique which involves heavy instruments, long processing time, production of instable nanoparticles with undesired size and sometimes contain impurities from materials handling. To overcome these issues, the nanosizing of pharmaceuticals using bottom-up approach get more attention in recent days.

In this project, we are developing a completely new technology that relies on two established techniques, crystallization, and molecular self-assembling. It is well understood that crystallization at right conditions is usually fast but always produce micron sized particles, whereas self-assembling suffers by the slower kinetics. In CRYSTASSEMB, we are developing a new technique that selectively favors self and fast assembling of molecules in supersaturated solution to produce spherical nanoparticles instead of nucleation.

In this project, we will demonstrate this new technology to produce nanoparticles in both batch and continuous mode, followed by upscaling the technique from lab-scale to at least pilot-plant scale level (in collaboration with our industrial partner).