

NylaNova

Startup: NylaNova

Startup Website: <https://www.nylanova.com/>

Startup Description:

NylaNova is a chemistry-driven startup focused on enabling circularity in synthetic textiles and plastics. The company develops advanced recycling technologies that recover high-quality materials from complex, mixed plastic waste streams that are currently considered non-recyclable. NylaNova's work spans solvent-based separation, chemical depolymerization, and process development aimed at producing feedstocks suitable for true closed-loop recycling.

Project Title:

Development of the SMART Process (Sequenced Multicomponent Advanced Recycling Technology) for Mixed Textile Waste

Project Description:

Modern textile waste streams often contain multiple polymer components such as Nylon-6, PET, polyolefins, and spandex, making them extremely difficult to recycle using conventional mechanical or chemical recycling methods. NylaNova has developed a catalytic chemical recycling process capable of handling mixed waste streams and selectively depolymerizing Nylon-6 back to its original monomer, caprolactam. Building on this core technology, NylaNova is now expanding its capabilities through the development of the SMART process (Sequenced Multicomponent Advanced Recycling Technology), a solvent-based approach designed to tackle even more challenging textile waste streams while also recovering non-Nylon-6 polymers as valuable materials.

The Summer Scholar will contribute to the early-stage development and evaluation of the SMART process. The project will focus on studying different solvent systems and separation sequences to selectively isolate Nylon-6, PET, polyolefins, and spandex from mixed textile waste. Depending on the purity and material quality of the recovered fractions, the separated polymers will be evaluated for downstream chemical recycling routes, such as depolymerization of Nylon-6 to caprolactam, and PET to terephthalic acid, or, if sufficiently pure, for potential mechanical recycling applications.

Key activities may include screening and testing solvent and solvent-mixture combinations for selective polymer dissolution or separation, evaluating different processing sequences based on textile composition, and characterizing recovered polymer fractions using analytical and physical methods. The project will also involve designing and refining experimental reactor setups to conduct these separations more efficiently, as well as developing and assessing solvent recovery steps at the end of the process. Recovered solvents will be evaluated for purity and suitability for reuse in subsequent recycling cycles. This project directly supports NylaNova's mission to enable scalable recycling solutions for complex, real-world textile waste streams.

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Project Expectations:

By the end of the internship, the scholar is expected to:

- Evaluate multiple solvent systems for selective separation of polymers from mixed textile waste
- Develop an initial decision framework for solvent selection and separation sequence based on waste composition
- Generate experimental data on purity, recovery yield, and material quality of separated polymers
- Provide recommendations on which recovered materials are suitable for chemical recycling versus mechanical recycling

Deliverables will include a written technical summary of experimental results, process observations, and recommended next steps, as well as a final presentation for Demo Day.

Desired Candidate Experience:

- Coursework or experience in chemistry, chemical engineering, materials science, or a related field
- Comfort working in a laboratory environment and following experimental protocols
- Ability to analyze experimental data and clearly communicate results
- Self-driven, proactive, and able to take ownership of tasks in a research-oriented setting
- Ability and willingness to conduct thorough literature and patent reviews to inform experimental design
- Willingness to troubleshoot experiments and adapt approaches as new data emerges
- Interest in sustainability, recycling, and circular materials

Training & Mentoring Opportunities:

The Summer Scholar will receive hands-on training in solvent-based separation techniques, polymer handling, and materials characterization. The student will work closely with NylaNova's technical team and receive regular mentorship from Yosi Kratish, providing exposure to both experimental process development and real-world challenges faced by early-stage recycling technologies. The internship also offers insight into startup-scale R&D and technology commercialization.