**Accelerating Enzyme Engineering for Plastic Recycling with Electrochemical Impedance Spectroscopy and Advanced Computational Methods**

At ESTER Biotech, we develop next-generation enzymatic solutions for the sustainable recycling of polyester-based plastics. Our patented technology platform integrates electrochemical impedance spectroscopy (EIS) to monitor polymer degradation in real time, enabling high-throughput and data-rich screening of enzyme candidates on real plastic materials.

This direct feedback on enzymatic activity and thermostability forms the foundation for our AI-driven enzyme design pipeline. By combining precise degradation kinetics from EIS with machine learning models, we accelerate the evolution of robust enzymes tailored for specific plastic recycling applications.

Beyond optimization for existing polymers, our approach opens the path toward “design for plastics” — where enzyme performance guides the development of entirely new plastic formulations engineered for efficient biocatalytic depolymerization from the outset.

We demonstrate how this integrated strategy shortens development cycles, increases predictability, and enables a more circular, adaptive, and fossil-free future for the plastics industry.