Stanford

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BIO

My research focuses on functional environmental microbiology and environmental analytical chemistry to uncover and harness microorganisms for chemical biotransformation. We integrate high-resolution mass spectrometry, meta-omics sequencing, molecular microbiology and biochemistry, and computational modeling to identify the functional microbes, genes, and enzymes that drive these processes. Building on these mechanistic insights, we aim to develop environmentally benign chemicals and novel biosolutions for bioremediation and waste-to-resource recovery.

I am also interested in how anthropogenic perturbations (i.e., chemical exposure) reshape microbial biodiversity and ecosystem function across natural and engineered ecosystems. We aim to resolve these cause–effect relationships and, using standardized and synthetic microbial communities, run comparable, hypothesis-driven experiments that translate fundamental insights into predictive tools and practical interventions. The aim is to help keep human activities within the safe operating space of planetary boundaries while advancing environmental and public health.