



**SPEECH INFORMATION (For Conference Program Book)**

Topic	<b>Harnessing marine microbes: A Genomics-Driven, application strategy for resource recovery</b>
<b>Abstract</b>	<p>The ocean, Earth's largest biosphere, harbors a vast diversity of microorganisms that represent a largely untapped reservoir of novel bioproducts and biotechnological solutions. These microbes are fundamental to global biogeochemical cycles and hold immense potential for resource recovery and industrial applications. However, the primary bottleneck in harnessing this potential has been that over 99% of marine microorganisms are considered "unculturable" by standard laboratory techniques, leaving their unique metabolic capabilities unexplored. This presentation introduces a cutting-edge strategy that leverages genomics, metagenomics, and AI-powered predictive modeling to overcome this cultivation barrier. By sequencing and analyzing microbial genomes directly from environmental samples, we can predict their metabolic pathways, nutritional requirements, and optimal growth conditions. These genomic insights, augmented by AI algorithms, enable us to design targeted, hypothesis-driven cultivation methods to successfully "awaken" and isolate these previously elusive microorganisms for resource development.</p> <p>We will showcase case studies where this genomics-first approach has led to significant discoveries: (1) The cultivation of novel bacteria from unique marine niches, leading to the discovery of enzymes with potential applications in bioplastic recycling and synthesis; (2) The targeted isolation of microbes with unique metabolic functions, providing a source for high-value bioproducts such as novel antibiotics, industrial enzymes, and biosurfactants; (3) The application of these newly cultivated strains as cellular factories for sustainable chemical production. In conclusion, by shifting the paradigm from traditional microbiology to a genomics- and AI-driven approach, we can systematically unlock the vast biotechnological potential of the marine microbial world. This strategy paves the way for sustainable resource recovery, effectively turning the ocean's hidden microbial diversity into a powerful engine for innovation in medicine, materials science, and green chemistry.</p>

