Session	NOVEL FERMENTATION and NOVEL DOWNSTREAM processing innovations
Title	Programming microbial control: bacteriocins for robust, antibiotic-free biobased biomanufacturing
Company	SYNGULON
Speaker	Guy HELIN
TRL	9
Keywords feedstock (max 2)	agnostic
Keywords technology (max 2)	Synthetic biology
Keywords End-Product (max 2)	fermentation

Abstract:

Industrial fermentation underpins production of biofuels, renewable chemicals, enzymes, recombinant proteins, and other biobased products, yet it faces two persistent causes of performance loss: contamination and genetic instability within production populations. Conventional control often relies on antibiotics or broad-spectrum antimicrobial chemicals, conflicting with the transition toward cleaner, safer, and more resource-efficient biomanufacturing.

Syngulon develops original genetic technologies based on bacteriocins, antimicrobial peptides naturally produced by bacteria, that can be integrated into engineered microbial systems to address both challenges. First, adding bacteriocins or programming the production microorganisms to secrete the bacteriocins that selectively suppress contaminants in the fermentation environment. Such microbial control reduces contamination-related losses and preserves the conversion of renewable feedstocks toward target products. The screening of bacteriocins can be done via the in-house PARAGEN collection (>500 bacteriocins).

Second, bacteriocin–immunity systems can replace antibiotic-resistance markers for plasmid selection in bioproduction. The producing cells continuously generate the selective pressure required to maintain the production population, thereby acting as a self-supporting “peer-policing” system throughout the entire process. Cells that retain the plasmid remain protected by the encoded immunity mechanism, whereas plasmid-free cells become susceptible to the bacteriocin produced within the culture. This technology has already been validated. In March 2026, Syngulon announced a non-exclusive licensing agreement with Elanco Animal Health.