Biogenic and Biodegradable Superabsorbent Polymers

Conventional petroleum-based superabsorbent polymers (SAPs) have been widely used in disposable diapers, agriculture, cosmetics, and packaging due to their exceptional ability to absorb tens to hundreds of times their own weight in water. However, synthetic SAPs are persistent pollutants that rely on non-renewable fossil fuels, are linked to skin irritation, toxic chemical exposure, and endocrine disruptors like phthalates, and have contaminated land and oceans globally with microplastics that persist for hundreds of years, prompting growing consumer and regulatory demands for safer, eco-friendly products. The demand for sustainable substitutes is surging, but existing bio-based alternatives often lack full biodegradability, require complex multi-step manufacturing processes involving large quantities of organic solvents, and are significantly more expensive than petroleum-based compounds. AC Biode is developing AC BioSAP, a fully bio-based, non-toxic superabsorbent polymer derived from abundant regional biomaterials like rice, corn, cotton scraps, and wood waste through a proprietary, energy-efficient one-step extrusion process, achieving water absorption up to 100 times its weight. For this I will bring samples and demonstrate the water absorption live on stage in real time. Additionally, AC BioSAP provides a circular end-of-life solution, achieving 100% biodegradability in soil within 52 days to leave zero microplastics, while remaining cost-competitive (¥500–1,000/kg) with synthetic alternatives. We will review the results from agricultural field trials in Japan, Ukraine and Portugal and custom development pilots with global brands. Will show performance and ISO 14855-2 biodegradability data compared to fossil-based and cellulose benchmarks, and the transformative potential of fully compostable SAPs for sustainable materials innovation on a global scale.