



Enzymatic Bleaching & Decolorization

Cut chemicals, heat, and effluent color – without sacrificing brightness. Our enzyme-enabled biobleaching generates oxidants *in situ* and directly oxidizes chromophores, delivering near-standard whiteness under milder, fiber-friendly conditions. Applicable across cotton, other cellulose, recycled fibers, and pulp & paper lines – ready to integrate into existing preparation and recycling trains.

BACKGROUND

Conventional bleaching in textiles and pulp & paper relies on high-alkali peroxide or legacy hypochlorite, driving energy use, fiber damage risk, and colored effluents that are costly to treat. Industry reviews highlight persistent challenges in removing color (and AOX where relevant) and call for lower-impact routes. Enzymatic solutions – biobleaching, enzymatic deinking, and bioremediation – are emerging for both sectors, improving brightness and reducing color while enabling milder conditions.

TECHNOLOGY

acib offers two complementary enzymatic modalities that fit into current unit operations. First, in-situ oxidant generation: CDH converts benign di-/oligosaccharides – including streams available from desizing – into H_2O_2 directly in the bath. In cotton trials, CDH delivered brightness around 92 ($\approx$ near the alkaline standard ~ 93), and simple process tweaks such as a brief pH shift or TAED activation halved bleaching time, enabling lower temperature and cleaner effluents. Second, direct chromophore oxidation: laccases target native flavonoids in cotton (e.g., morin, rutin, quercetin, luteolin), reducing yellowness before or alongside peroxide stages. We're able to extend the same toolbox to pulp & paper: CDH-based color removal in tertiary effluent treatment, enzyme-assisted brightening of recycled fibers, and synergy with established enzymatic deinking trains – engineered around oxygen transfer, mediator/activator choice, and fiber-strength retention.

OFFER

We co-develop application-specific packages across textiles (cotton, denim, viscose/lyocell, blends) and pulp & paper (newsprint, fine paper, tissue, packaging). Scope includes enzyme selection and sourcing (CDH, laccase $\pm$ activators), bath chemistry and oxygen-transfer engineering, reuse of desizing liquors as CDH feed, integration with deinking/bleaching sequences, and pilot-to-mill validation (brightness/whiteness, ERIC ink count, tensile/abrasion, color/COD). We can transfer full project IP to the company partner and start under NDA; you receive a tailored customized plan with milestones, success criteria, scale-up parameters to fit your specific need.

EXPERTS

Prof. Dr. Georg Gübitz

DEVELOPMENT STATUS:

Technology Readiness Level 4
(Technology Validated in Lab)

KEYWORDS

- Biobleaching
- Decolorization
- Enzymatic Deinking
- Cotton-Industry
- Desizing Liquor Reuse
- Recycled Fibers
- Pulp-Mill Effluent
- Low-Temperature Bleaching
- Brightness/Whiteness

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