



Perfectly Positioned Lectin BioSensors

Randomly immobilized proteins point in all directions; signals drop, background rises, and reproducibility suffers. With acib's site-specific immobilization, proteins land in the right orientation every time, resulting in greatly improved sensitivity – a leap toward earlier, more reliable detection.

BACKGROUND

Lectins are powerful glycan recognizers for oncology, infection, and immunity, but their diagnostic value depends on how they are attached to the surface. Random amine/thiol coupling produces heterogeneous orientation that can bury binding sites, degrade sensitivity, and weaken lot-to-lot reproducibility. Reviews consistently show that controlling probe orientation is among the most effective ways to boost biosensor performance across formats, from SPR and electrochemistry to lateral flow. Attempts to “fix” orientation with fusion tags help but constrain attachment to protein termini, can perturb folding, and still limit access to optimal anchoring sites. Oriented lectin microarrays demonstrated better activity and lower detection limits than randomly coupled controls, underscoring the value of true site-specific placement for glycan analytics.

TECHNOLOGY

We place a single, bioorthogonal handle exactly where it preserves function and exposes the recognition site. Using genetic code expansion, we encode noncanonical amino acids at pre-selected residues and covalently “click” the protein to the surface via strain-promoted azide-alkyne cycloaddition (SPAAC), a copper-free ‘click’ reaction that links an azide on the protein to a strained alkyne on the surface in water – fast, bioorthogonal, and gentle on activity. This yields monofunctional, uniformly oriented layers that transfer across platforms (SPR, BLI, EIS, microarrays, LFAs). In head-to-head experiments with a galectin-1 lectin sensor, our directed immobilization enabled robust detection at low analyte levels and delivered ~12x higher response than random NHS (N-hydroxysuccinimide ester) chemistry, directly illustrating the gain from precise orientation.

OFFER

We scope the target application (analyte, matrix, platform) and recommend the optimal lectin and attachment site(s), then produce and characterize site-specifically immobilized constructs with comparative data versus standard chemistry. Deliverables typically include rationale for handle placement, immobilization SOPs, sensor performance metrics, and guidance for scale-up and regulatory-friendly materials selection.

Ready to see the uplift on your platform? Share your target, matrix, and readout, and we'll return a focused scoping brief with recommended constructs, workflows, and validation endpoints.

EXPERTS

PD Dr. Birgit Wiltschi

DEVELOPMENT STATUS:

Technology Readiness Level 4
(Technology Validated in Lab)

KEYWORDS

- Site-Specific Immobilization
- Copper-Free Click Chemistry
- Non-Canonical Amino Acids
- Single-Point Attachment
- Higher Signal-to-Noise
- Sensitivity Boost
- Lower Limit of Detection (LoD)
- von Willebrand Factor (vWF)

CONTACT

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