LABEL-FREE OPTICAL BIOSENSING · IRIS PLATFORM

Multiplexed, High-Sensitivity Antibody Affinity Profiling on a Single IRIS Chip

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Microarrays on an IRIS chip turn one label-free experiment into rich, highly multiplexed binding-kinetics data — dozens of ligands profiled side by side under identical conditions.

The bottleneck

Screening antibodies against targets such as anthrax lethal factor (LF) demands kinetic data on many ligands at once. Surface plasmon resonance (SPR) is the gold standard for affinity but is limited to a few channels. Imaging SPR and BLI add throughput yet bring a higher noise floor, costly gold surfaces, buffer-jump artifacts, or mass-transport limits that distort the measured kinetics.

The IRIS approach

IRIS reads the interference signal from a dual-layer SiO2/Si chip to track biomass accumulation in real time, label-free. Antigens and antibodies are printed as a microarray with a benchtop spotter, so a single chip carries dozens of spots imaged simultaneously. A thin quasi-2D surface avoids hydrogel diffusion effects, and no reference channel or buffer-matching is required.

0.2 pg/mm²
Demonstrated surface mass sensitivity — rivaling SPR

281–824
Signal-to-noise ratio across spotted reagents

30+ ligands
Profiled in parallel on one microarray chip

> **"IRIS combines comparable sensitivity to SPR with far higher multiplexing capability...**
>
> **... saving time, reagents, and improving run-to-run variability."**

What the multiplexed study demonstrated

Anti-LF single-chain camelid antibodies (VHH) were profiled against injected LF antigen.IRIS-derived k_{on}, k_{off} and K_D agreed with previously published SPR values, and one ligand (JMO-B9) that gave no measurable SPR signal produced clear, meaningful binding on IRIS. Scaling up, a panel of anti-LF ligands was screened against whole lethal toxin (LTx) and then LF, with complementary antibodies injected in sequence to reveal binding pairs — the profiling experiment shown in Figure 1 on the next page.

How the assay works

1 Spot
Antigens & antibodies printed as a microarray with a benchtop spotter

2 Image
Label-free interference on a SiO_2/Si chip tracks biomass in real time

3 Fit
Global 1:1 (or bivalent) fits yield k_{on}, k_{off}, K_D and reveal binding pairs

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FIGURE 1 · MULTIPLEXED PROFILING IN ONE RUN

One chip, one experiment: binding of LTx and LF to a whole panel of anti-LF ligands

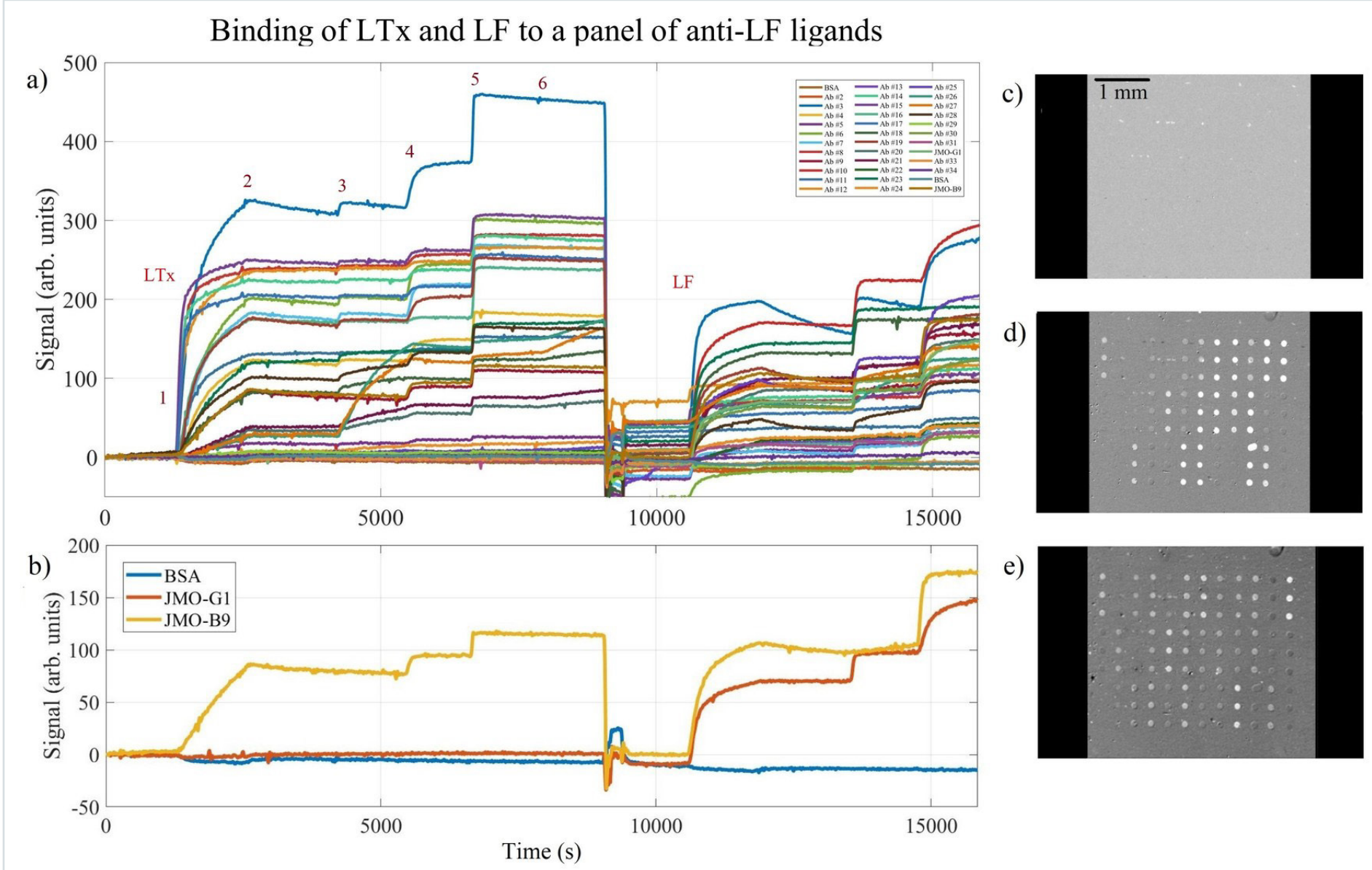


Figure 1. (a) Average binding signal for every spotted anti-LF ligand. LTx is injected first, then running buffer, then complementary antibodies #1–#4 in sequence (steps 1–6); the same sequence is repeated for LF. (b) Selected curves: JMO-B9 binds both LTx and LF, while JMO-G1 binds only purified LF. (c–e) Difference images at baseline, after LTx, and after LF.

Reading the profile

Each distinct “step” in panel (a) is a fresh antibody injection, so a single time course captures the binding fingerprint of the entire panel at once. Sequential injection exposes complementary binding pairs directly — information immediately useful for immunoassay design. The contrast between JMO-B9 and JMO-G1 is the payoff: because JMO-G1 binds isolated LF but not the LTx complex, its epitope is likely masked by the protective antigen in the toxin. That mechanistic insight falls straight out of one multiplexed run.

IRIS

THE TAKEAWAY

Microarrays on an IRIS chip are a powerful engine for multiplex profiling: SPR-class sensitivity, no reference channel or buffer-jump artifacts, and dozens of ligands screened for affinity and binding pairs in a single, low-cost experiment.