The Tyranny of Langmuir: strategies to tune, narrow and extend the dynamic range of biosensors

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Abstract
Despite the many positive features of - and successful development of biosensing technologies based on – biomolecules, the physics of single-site binding limits their use in many applications. The useful dynamic range of biological receptors indeed spans a fixed, 81-fold change in concentration centered on the dissociation constant. Misalignment between the placement of this range and the expected range of target concentrations reduces both sensitivity and specificity, and it is likewise often limiting. To overcome this limitation, Nature has developed a number of mechanisms, such as allostery and cooperativity, to easily tune, narrow and extend the dynamic range of target concentration and optimize sensitivity and specificity. In this talk I will show how it is possible to artificially reproduce these mechanisms through biomolecular design of nucleic acid receptors. [1, 2, 3] Reproducing these naturally-occurring mechanisms can be of value to improve biosensing and offer viable solutions to a wide range of bioanalytical problems.

References
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