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Illuminating Bacterial Signaling with RNA-Based Biosensors

My research asks, what can we program RNAs to do *in vivo* beyond base-pairing interactions? Thus, I conceived of starting with riboswitches, natural RNA scaffolds that fold into stable, active structures, and then exploring how to design or evolve new functions. Based on this principle, my research group has made novel RNA-based tools that are robust and context-independent, including biosensors with high fluorescence turn-on that function in all bacteria and suicide exons with high gene activation that function in all plants. In this lecture, I will focus on our development of RNA-based fluorescent biosensors, presenting design principles we have learned, challenges that remain to be tackled, and finally applications to the study of bacterial signaling that have the potential to greatly expand our synthetic biology toolbox.