

## **Title: Harnessing Inteins in Chemical Biology: From Ligases to Transposases and Logic Gates**

Inteins are auto-processing domains found in organisms from all domains of life. These proteins are consummate molecular escape artists that spontaneously excise themselves, in a traceless manner, from proteins in which they are embedded. Chemical biologists have long exploited various facets of intein reactivity to modify proteins in myriad ways for both basic biological research as well as translational applications. Here I discuss our recent efforts to engineer inteins for protein engineering applications in the test tube and in cells. I will also describe the development of an autonomous decision-making protein device driven by proximity-gated protein trans-splicing that can perform various Boolean logic operations on cell surfaces, allowing highly selective recruitment of enzymatic and cytotoxic activities to specific cells within mixed populations.

### **Most relevant publications**

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Thompson, R.E., Muir, T.W. Chemoenzymatic Semisynthesis of Proteins. *Chemical Reviews*, 2020, 120, 6, 3051–3126.

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Dawson, P.E., Muir, T.W., Clark-Lewis, I., Kent, S.B.H. Synthesis of proteins by native chemical ligation. *Science*, 1994, 266, 5186, 776–779.