Abstract

In the last decades, recombinant protein complexes such as antibodies and immunotoxins has seen an exponential growth as eminent candidates for therapeutic applications. However, the development of recombinant chimeras is often laborious and the activities of fused enzymes can be significantly reduced. Moreover, it is not possible to use genetic engineering methods to prepare modular protein hybrids with synthetic entities, e.g. antibody-drug conjugates, to impart additional functions. Nature, on the other hand, has expanded the proteome and the diversity in protein structures and functions, through posttranslational modifications. This suggests that the development of synthetic methodologies could hold immense promise to increase the current repertoire of protein therapeutics.

Our strategy focuses on developing integrative chemical platforms that allow the customization of biotherapeutics to address specific systems, for instance, intracellular transport, molecular targeting, controlled release, etc. In this manner, we seek to overcome the limits of chemistry and biology in protein design and therefore, broaden the scope of the medical applications by merging the best of both worlds. This talk will highlight some of our recent efforts to synthetically customize functional protein hybrids for biomedical applications.