

Precision engineering using designer proteins

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Abstract

Rational protein design provides a powerful approach for elucidating molecular phenomena at different time and length scales. Traditionally used in structural biology designer proteins are attracting increasing interest as engineering tools for creating novel materials with functions and properties defined at the nanoscale.

Synthetic designs emulating native biological assemblies underpin various applications. Examples include encapsulating systems for gene therapy, fibrillar structures for tissue repair, and autonomously responsive antimicrobial agents. The main rationale here is to emulate natural molecular assemblies whose adaptation can lead to specialist, albeit simplified, constructions improving our understanding of macromolecular organisation and its relation to function in a variety of biomedical contexts.

Recent designer proteins and their applications, in particular in the area of targeted gene delivery, will be highlighted here.