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## Cell-free protein synthesis in micro compartments: building a minimal cell from biobricks

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### Highlights

- Bottom-up construction of minimal cells
- Advances in cell free protein synthesis in synthetic biology
- Microfluidic high-throughput methods

### Abstract

The construction of a minimal cell that exhibits the essential characteristics of life is a great challenge in the field of synthetic biology. Assembling a minimal cell requires multidisciplinary expertise from physics, chemistry and biology. Scientists from different backgrounds tend to define the essence of ‘life’ differently and have thus proposed different artificial cell models possessing one or several essential features of living cells. Using the tools and methods of molecular biology, the bottom-up engineering of a minimal cell appears in reach. However, several challenges still remain. In particular, the integration of individual sub-systems that is required to achieve a self-reproducing cell model presents a complex optimization challenge. For example, multiple self-organization and self-assembly processes have to be carefully tuned. We review advances and developments of new methods and techniques, for cell-free protein synthesis as well as micro-fabrication, for their potential to resolve challenges and to accelerate the development of minimal cells.

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