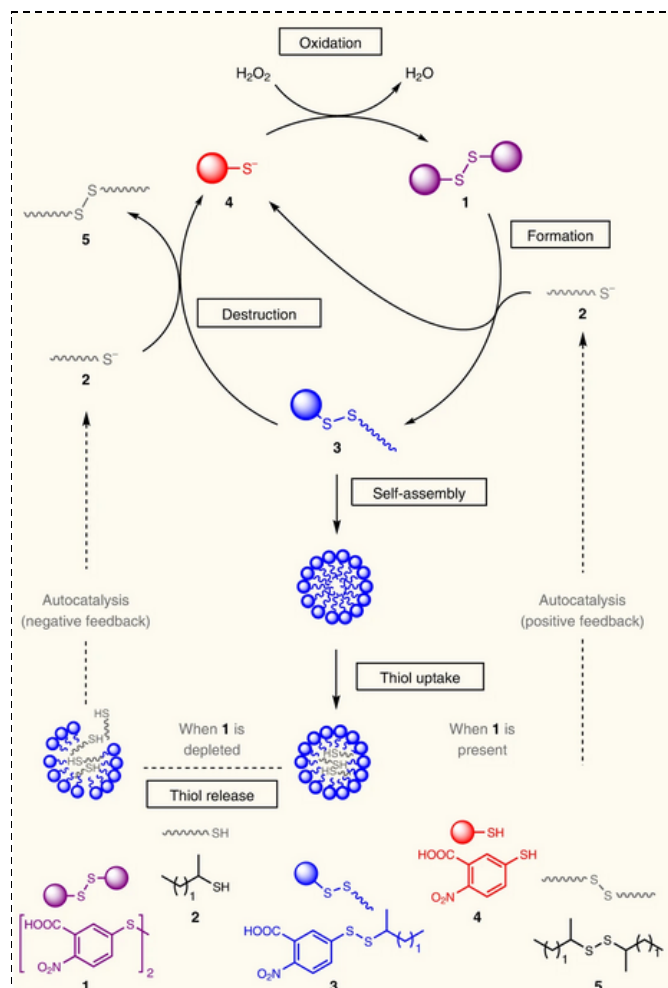


Howlett, M. G.; Engwerda, A. H. J.; Scanes, R. J. H.; Fletcher, S. P. An Autonomously Oscillating Supramolecular Self-Replicator. *Nat. Chem.* 2022, 1–6. <https://doi.org/10.1038/s41557-022-00949-6>.



**Figure 1** | Reaction cycle describing the chemical steps and feedback processes involved in the oscillations: formation, self-assembly, thiol uptake, thiol release, destruction and oxidation.

### Who are the corresponding authors and what are their research areas?

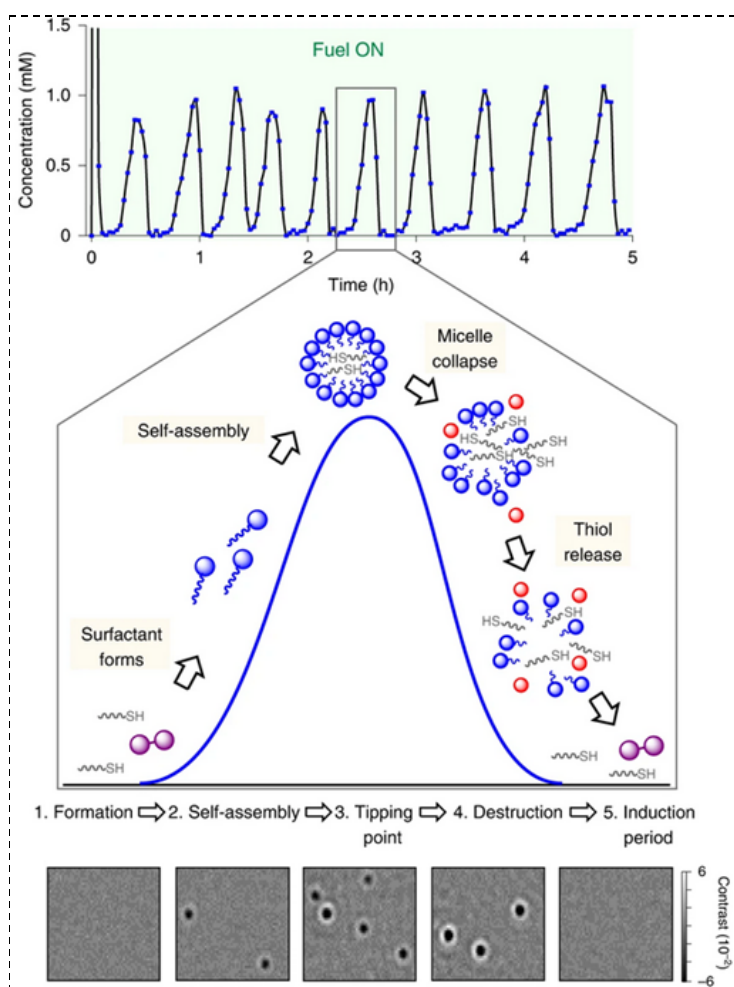
Stephen P. Fletcher - Professor of Chemistry at the University of Oxford, Oxford, UK. His research interests include asymmetric catalysis, origins of life, and synthesis.

### What is the main claim of the article?

This study presents a purely synthetic biomimetic system of supramolecular self-replicators that achieves autonomous, controllable, and sustained oscillations of supramolecular compartments (micellar species). This dynamic behavior (oscillation) of a system across different length scales (coupling molecular and supramolecular feedback processes) is considered to be an important piece in the chemical evolutionary path to cellular biochemical machinery.

## How is it demonstrated?

The existence of oscillations at the molecular level was demonstrated by the concentration profile of the species **1-4** in the aqueous phase (the system was followed by aliquots collected regularly and analyzed by UPLC). In addition, it has been demonstrated that there are oscillations in the quantity of self-assembled micelles in time (determined via interferometric scattering spectroscopy - iSCAT) and that both oscillations (of molecular and supramolecular entities) occur in a concerted manner (**Figure 2**).



**Figure 2 | (Top)** Molecular-level kinetics, showing oscillations in the concentration of species 3, and a representation of the stages of an oscillation. **(Bottom)** Supramolecular kinetics using iSCAT images of the oscillating system reveal that the number of micelles oscillate in phase to the concentration of 3.

## What are the typical experimental conditions?

The biphasic system consists of a stirred aqueous solution of compound **1** (0.058 mmol) and DMAP in the TRIS buffer (0.5 M) and the organic phase (**2**, 2.87 mmol). Addition of hydrogen peroxide was done by syringe pump.

## Which are the key related papers?

(1) Howlett, M. G.; Scanes, R. J. H.; Fletcher, S. P. Selection between Competing Self-Reproducing

Lipids: Succession and Dynamic Activation. *JACS Au* **2021**, *1* (9), 1355–1361.  
<https://doi.org/10.1021/jacsau.1c00138>.

(2) Morrow, S. M.; Colomer, I.; Fletcher, S. P. A Chemically Fuelled Self-Replicator. *Nat. Commun.* **2019**, *10* (1), 1011. <https://doi.org/10.1038/s41467-019-08885-9>.

(3) Leira-Iglesias, J.; Tassoni, A.; Adachi, T.; Stich, M.; Hermans, T. M. Oscillations, Travelling Fronts and Patterns in a Supramolecular System. *Nat. Nanotechnol.* **2018**, *13* (11), 1021–1027.  
<https://doi.org/10.1038/s41565-018-0270-4>.