

COST Action no. CM0703

Systems Chemistry

2008 | 2012

Objectives

- **Overall objective:** To investigate autocatalytic reaction systems within supramolecular, prebiotic, and other fields of chemistry and integrate these into dynamic supersystems that go towards synthetic life.
- **Secondary objectives:**
 - i) To understand the transition from the non-living to the living state of matter.
 - ii) To find the chemical roots of the complex interplay between genetics, metabolics, and compartmentalisation in life.
 - iii) To understand the interplay between the emergence of homochirality and the emergence of life.

Main Achievements

- The discovery of how ribonucleotides (the building blocks of RNA) can be produced under prebiotically relevant conditions in an approach that is truly “systems chemistry”.
Sutherland et al. Nature **2009**, 459, 239.
- The discovery of a new self-replicating system where competition between two replicators is decided by mechanical energy. Importantly, mechanical energy can liberate replicators from an inactive self-assembled state.
Otto et al. Science **2010**, 327, 1502.
- The launch of the open-access *Journal of Systems Chemistry* by three action members.

**Chemistry and Molecular Sciences and Technologies (CMST)**

Participating countries

CH, CZ, DE, DK, ES, FI, FR, HU, IL, IT, IE, PL, PT, SK, SE, TR, UK

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Working Group activities

Working Group 1: Integration of genetic and metabolic subsystems

- 28/29 April 2009: Opening Symposium Centre for Systems Chemistry and COST CM0703 Working Group 1 Kickoff Meeting. University of Groningen, The Netherlands.
- 24-26 May 2010: Recent Topics in Systems Chemistry: Molecular Replication and Computation. Lemeridien hotel, Dead Sea, Israel.

Working Group 2: Integration of genetic and compartmentilization subsystems

- 6 October 2009: 1st Scientific Meeting for Working Group 2 Conference Center, Frankfurt Airport, Germany.

Working Group 3: Integration of metabolic and compartmentilization subsystems

- 16-18 April 2009: 1st Scientific Meeting for Working Group 3. ETH Höggerberg campus, Zürich, Switzerland.

Working Group 4: Chiral symmetry breaking and the quest for asymmetric autocatalysis in various reaction systems

- 15-17 May 2009: 1st Scientific Meeting for Working Group 4. Hotel Waldstätter Hof, Brunnen, Switzerland.
- 23-25 April 2010: Scientific Meeting for Working Group 4. Taormina, Italy.

Working Group 5: Integration of theoretical chemistry, theoretical biology and complex systems (physics) research towards systems chemistry

- 7/8 October 2009: Scientific Meeting for Work Group 5. Collegium Budapest, Hungary.

CM0703 Conferences, Workshops, Training Schools

- 7-11 October 2008, ChemBioGenesis 2008, Maratea, Italy.
- 18-23 October 2009, ESF-COST High-Level Research Conference. Systems Chemistry II: Evolutions and Systems. Anna Grand Hotel, Balatonfüred, Hungary.
- 23-27 October 2009, ChemBioGenesis 2009, Balatonfüred, Hungary.



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