第 242 回

物質科学セミナー

総合科学プロジェクト「要素-システム研究」セミナーとの共催

題名：**Experimental study of decanol droplets life-like behaviour**

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日時：**2017 年 7 月 11 日（火） 16:20 – 17:50**

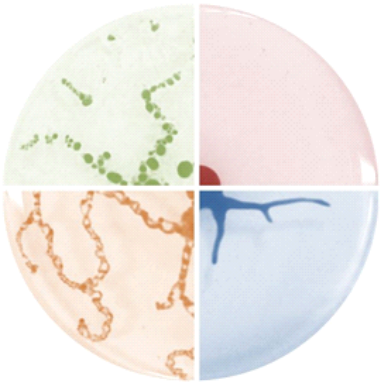
場所：総合科学部　**J303**

講演要旨：

Our work focuses on a simple system consisting only of decanol, water, sodium decanoate and salt. We focus on the life-like behaviour of droplets, namely movement and shape changes. We have described how such simple droplets can be an embodiment of liquid robots (1).

Very interesting phenomena are observable in minute time scale. Decanol droplet placed in thin layer of decanoate is able to follow the salt gradient and perform chemotactic movement (2). Chemotaxis in biology defines the oriented motion of cells or organisms towards or from the source of chemicals (3). With decanol droplets it is possible to mimic chemotactic responses, in both straight channels and topologically complex systems, such mazes. This droplet system has also the ability to reverse the direction of movement repeatedly, to carry and release a chemically reactive cargo, to select a stronger concentration gradient from two options, and to initiate chemotaxis by an external temperature stimulus.

In the longer time scale (several hours), the decanol droplet surrounded by decanoate solution containing salt performs fantastic shape changes. In dependence on initial system composition, interesting patterns are observable during the evaporation of decanoate solution (e.g. stars, tentacular structures). We analysed the morphology of these structures at both the macroscopic and microscopic scale across a large range of initial conditions (4). Such reproducible morphological changes when the originally spheroidal decanol droplets develop branching patterns mimic the appendage growth of bacteria or axon growth. Although the single droplet behaviour has been studied in detail already, we are focusing now also on the collective behaviour of decanol droplets. Results showing intriguing mutual droplets interactions will be presented.



1. **Čejková J, Banno T, Štěpánek F, Hanczyc MM. Droplets as Liquid Robots. Artificial Life Journal. 2017. (accepted)**
2. **Čejková J, Novăk M, Štěpánek F, Hanczyc MM. Dynamics of Chemotactic Droplets in Salt Concentration Gradients. Langmuir. 2014; 30(40):11937-44.**
3. **Čejková J, Holler S, Quyen NT, Kerrigan C, Štěpánek F, Hanczyc MM. Chemotaxis and chemokinesis of living and non-living objects. In: Adamatzky A, editor. Advances in Unconventional Computing, Springer; 2017. p. 245-60.**
4. **Čejková J, Štěpánek F, Hanczyc MM. Evaporation-induced pattern formation of decanol droplets. Langmuir. 2016; 32(19):4800−5.**

5 研究科共同セミナーの認定科目です

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