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« Programming dynamic behaviors with synthetic DNA instructions »

Molecular programming techniques based on synthetic DNA oligonucleotides are currently opening unprecedented opportunities for the exploration of molecular-scale information processing. The dynamic behavior of reaction networks is controlled by the topology of the circuit, but also depends on the kinetic properties of each individual component. Therefore, efficient molecular programming langages should provide generic tools to control simultaneously these two aspects. Because DNA allows easy encoding of molecular interactions and possesses a rich biochemistry, it become possible to reproduce, in test tubes, some of the fundamental dynamical systems underlying biological regulation circuits, like oscillators, bistable switches, etc. These approaches provide a unique opportunity to better understand structure/function relationships at the level of biological networks, but also to use such molecular circuits in pratical applications. In combination with high throughput microfluidics approaches, I will discuss in particular a recent work aiming at visualizing experimentaly the bifurcation diagram of these networks.