# Is there a role for abiotic components in synthetic multi-cellular constructs?

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**Abstract :**

In the last few years, I have become interested in the idea that "simple" multi-cellular constructs, enabled by findings in developmental biology and advances in synthetic biology, might be within reach (Maharbiz, Trends in Cell Biology, 2012). More specifically, I am fascinated by the idea that abiotic (i.e. non cell-based) components might have a role to play in such constructs. Such components could aid in breaking symmetry in a developing system, impose boundary conditions on the multi-cellular ensemble to guide development or provide functions not found in nature (e.g. digital computation, large memory, non-biological communication, etc.). Biological systems did not evolve radios or 22-nm transistors; man-made communication and computational systems have reached a staggering degree of sophistication in incredibly small, low-power packages (e.g., the off-theshelf ATtiny10 from Atmel is a 12-MHz, 8-bit microcontroller with a 1024-byte flash memory in a package 2 mm square; unpackaged, it is about half this size). The power requirements for such systems are dropping rapidly and can be in the microwatt range. Regardless of how natural colonial and multi-cellular systems arose, human engineers need not build them that way. As part of the talk, I will touch on a recently funded effort with Adam P. Arkin, Murat Arcak and Caroline Ajo-Franklin to work on this problem.