

Systems & Synthetic Biology

August 18-20, 2016 London, UK

Designable RNA architectures for rapidly engineering and analyzing synthetic metabolisms

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Programmable RNA devices and systems can be engineered for applications in biosensing, information processing and dynamic genetic control. In principle, by combining advanced computational simulations with massively-scaled experimental analysis we investigate the limits of RNA device and system design and engineer synthetic metabolisms to produce medically and industrially-important materials. Here, I will present results using new designable molecular architectures for engineering ultrasensitive RNA aptamer nanosensors as technologies for parallelized metabolic output profiling, a novel class of riboswitch-aptazymes as dynamic metabolite-responsive feedback controllers and programmable guide RNA (gRNA) expression platforms for implementing complex CRISPR-dCas9-based transcriptional networks.

Biography

James M Carothers is currently an Assistant Professor at the University of Washington and an Investigator of the Engineering Biology Research Consortium. Previously, he was a Postdoctoral Fellow with pioneering synthetic biologist Jay D. Keasling at the University of California Berkeley. He has earned his PhD at Harvard University with 2009 Nobel Prize-winner Jack W Szostak. He has a BS in Molecular Biophysics and Biochemistry from Yale. His co-authored papers have been cited more than 1300 times and his recent work in synthetic biology has been recognized by the University of Washington Presidential Innovation Award and the Alfred P. Sloan Research Fellowship.

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