

Literature Report

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RNA Imaging

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A Color-Shifting Near-Infrared Fluorescent Aptamer–Fluorophore Module for Live-Cell RNA Imaging

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Authors introduce



PROF. DR. ANDRES JÄSCHKE

- 1984 - 1988** Studies of chemistry at Humboldt University, Berlin
- 1989 - 1993** Ph. D. studies with Prof. Dr. Dieter Cech at Humboldt-University, Berlin
- 1993 - 1995** Postdoctoral Fellow / Associate at MIT with Prof. Alexander Rich
- 1995 - 2002** Group leader at the Institute of Chemistry at Free University Berlin
- 1998** BioFuture Award of the State Department of Research and Technology (BMBF)
- 2000** Habilitation in Bioorganic Chemistry (Free University Berlin)
- 2002** Full Professor of Pharmaceutical Chemistry

Our laboratory explores unknown roles of RNA modifications, in particular RNA-linked coenzymes, in biology. Furthermore, we **develop methods for imaging and microscopy of RNA in living cells**, with a focus on **super-resolution techniques**. In another research area we develop, characterize and apply photoswitchable biomolecules. We also have a long-standing interest in the origin of life. Our work combines **organic synthesis with molecular and cellular biology, biochemistry, bioinformatics and modern bioanalytical methods**.

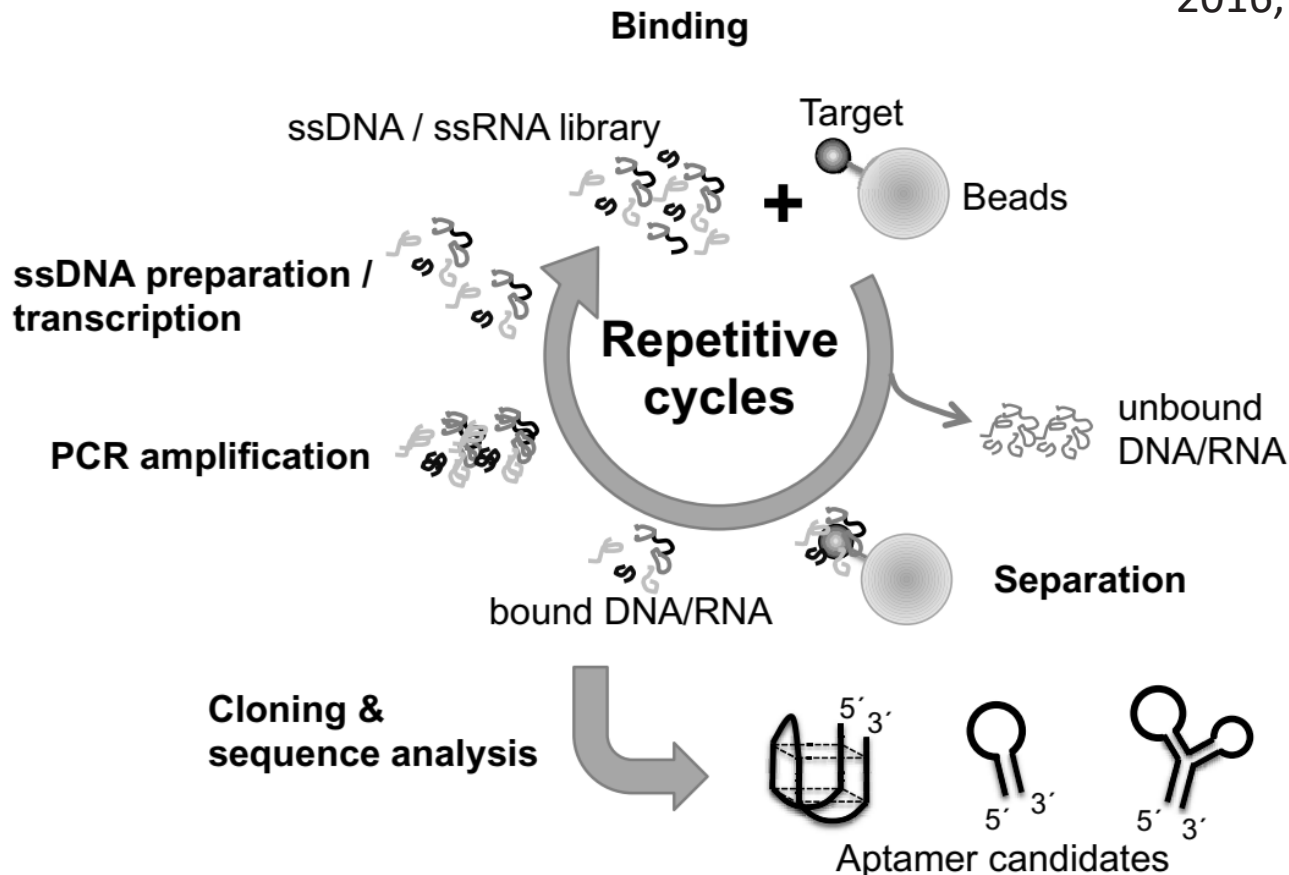
Background



Aptamers, first described in **1990** by *Tuerk* and *Gold* and *Ellington* and *Szostak*.

Aptamers adopt complex threedimensional structures capable of recognizing target molecules with **high affinity and specificity comparable with those of antibodies**.

2016, ISBN 978-981-4669-83-2 (eBook)

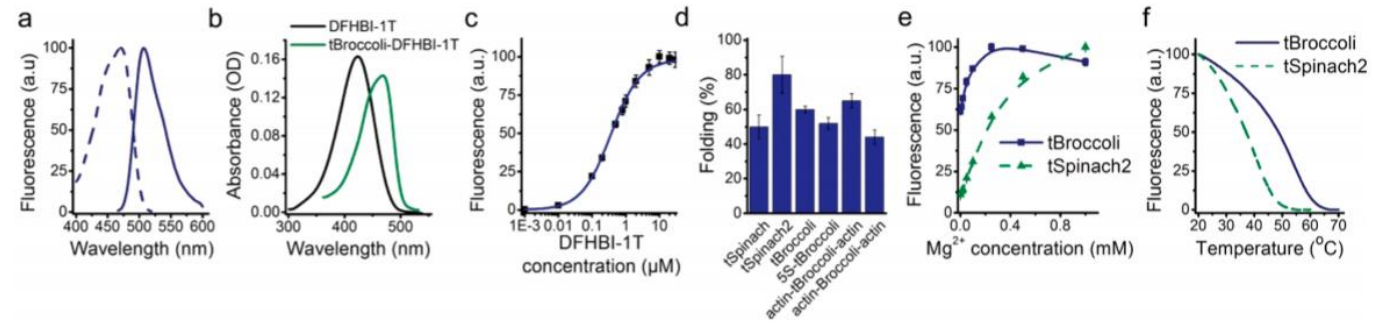
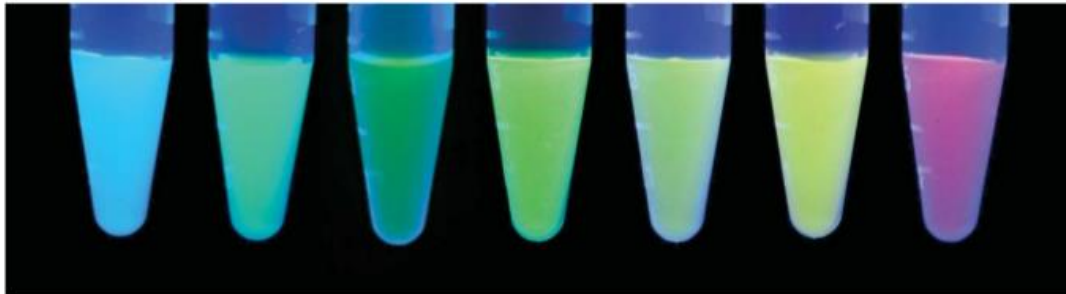
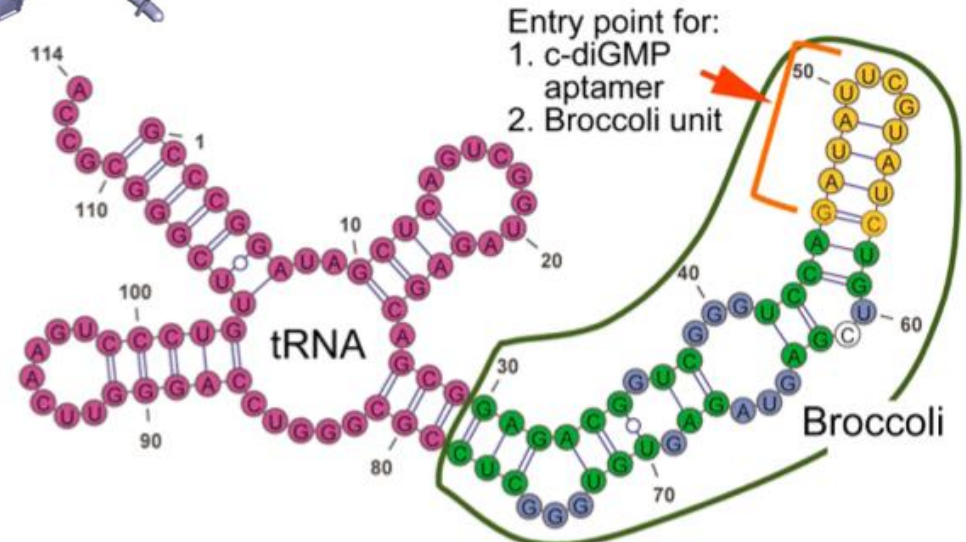
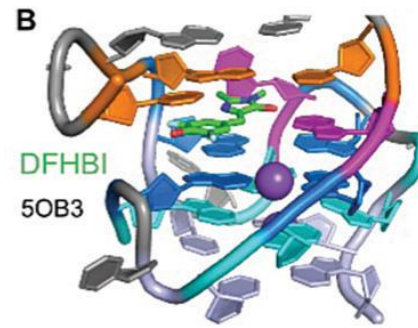
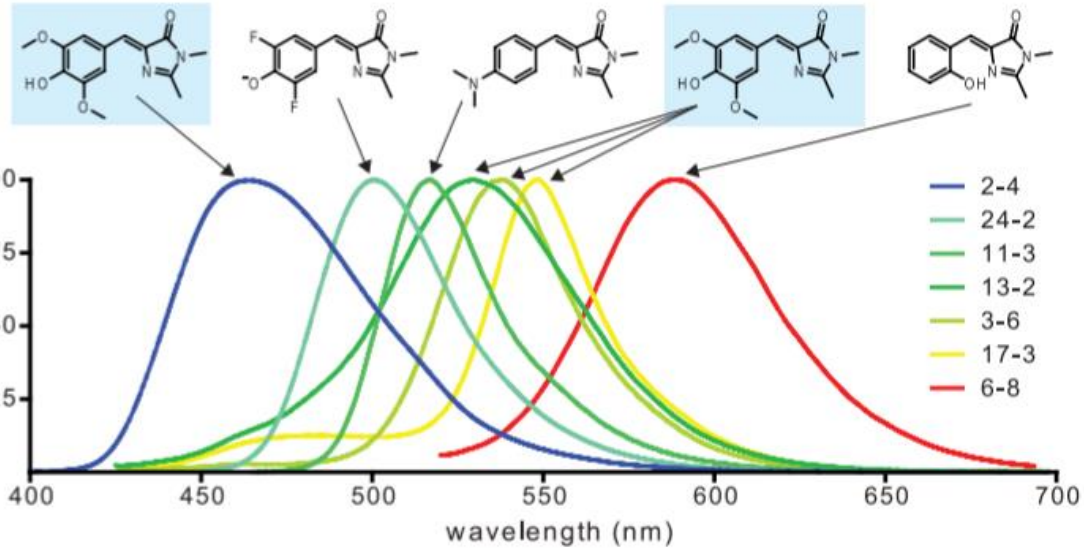


Aptamers have been developed for a variety of target molecules such as **metal ions, small molecules, peptides, proteins, microorganisms, cells, and tissues**.

- i) vibrational and rotational motions**
- ii) ground-state complex formation**
- iii) spirolactonization**

Background

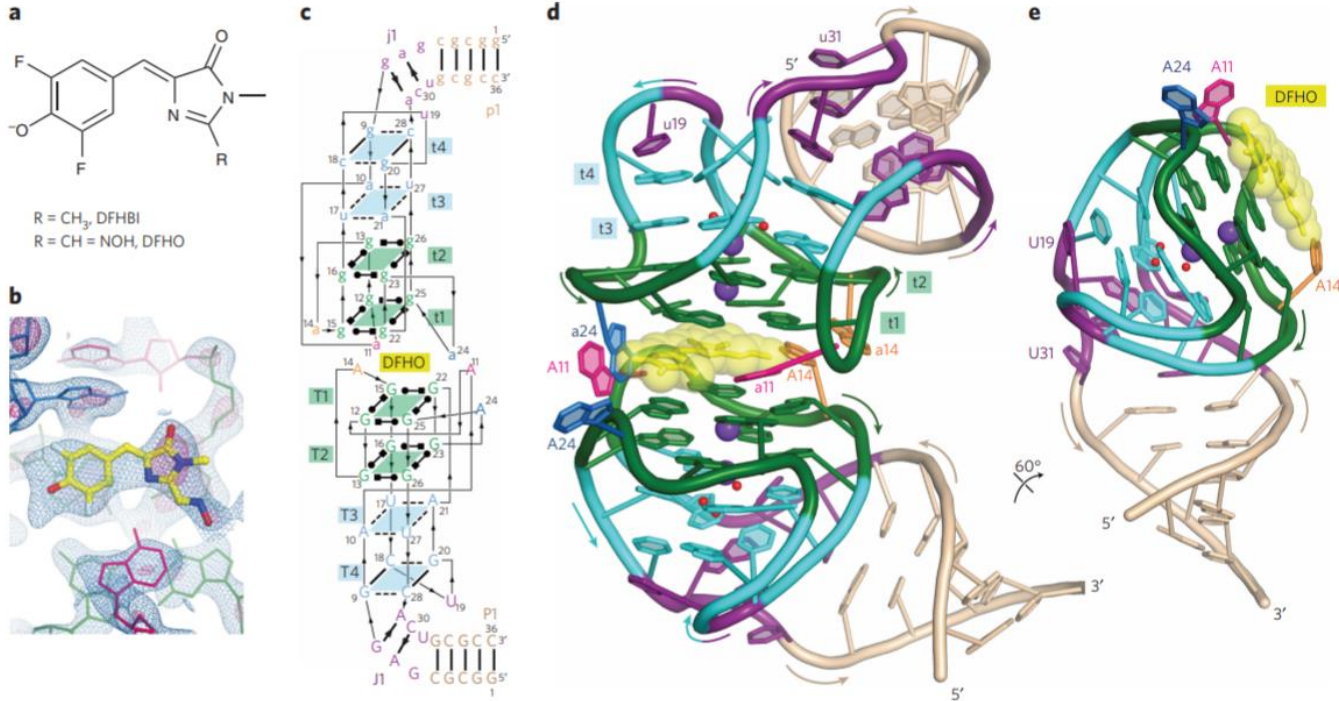
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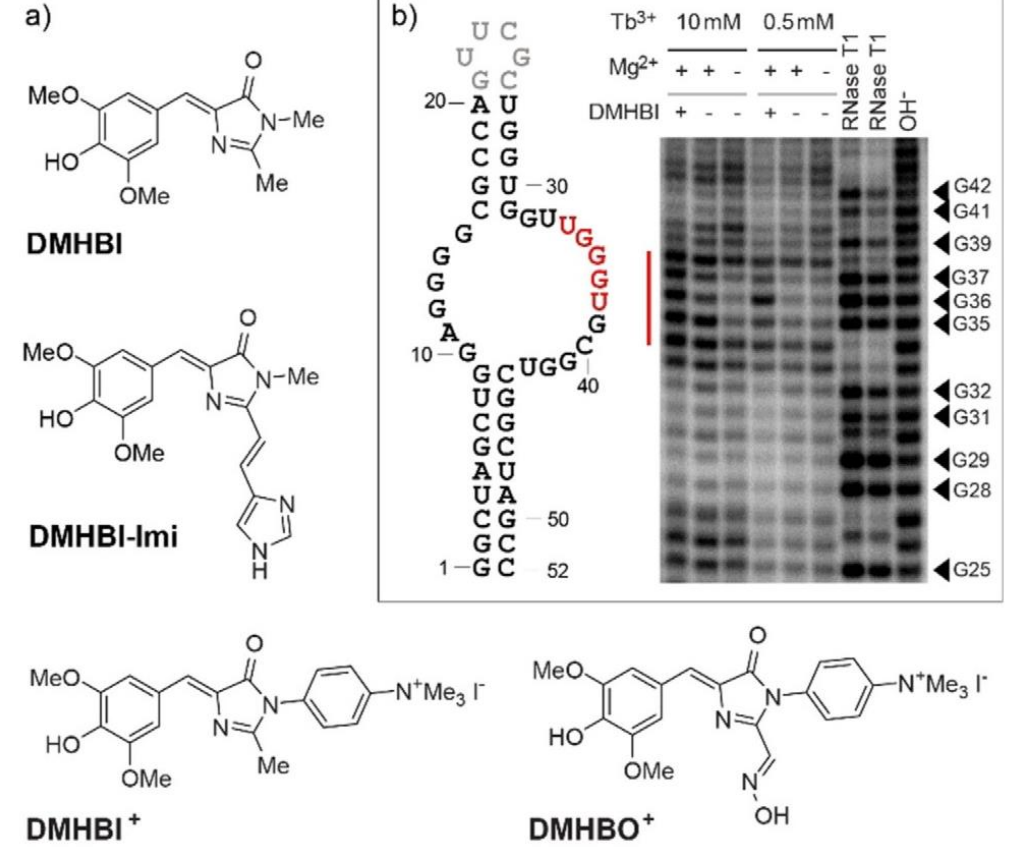
Science 2011,333, 6042, 642-646

J. Am. Chem. Soc. 2014, 136, 46, 16299-16308

Background

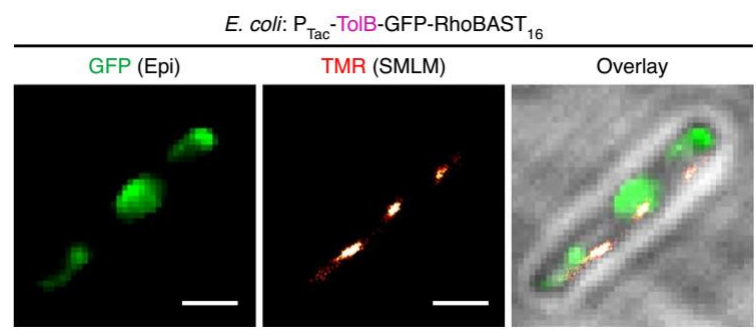
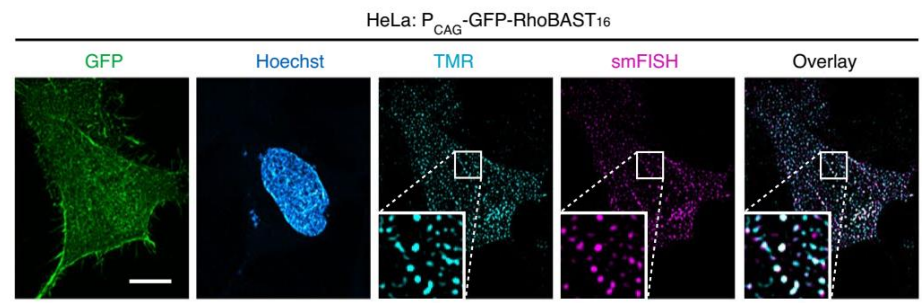
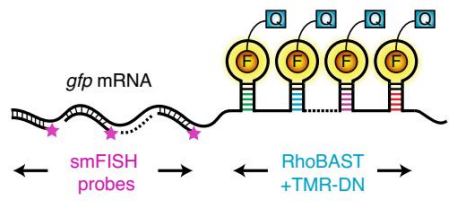
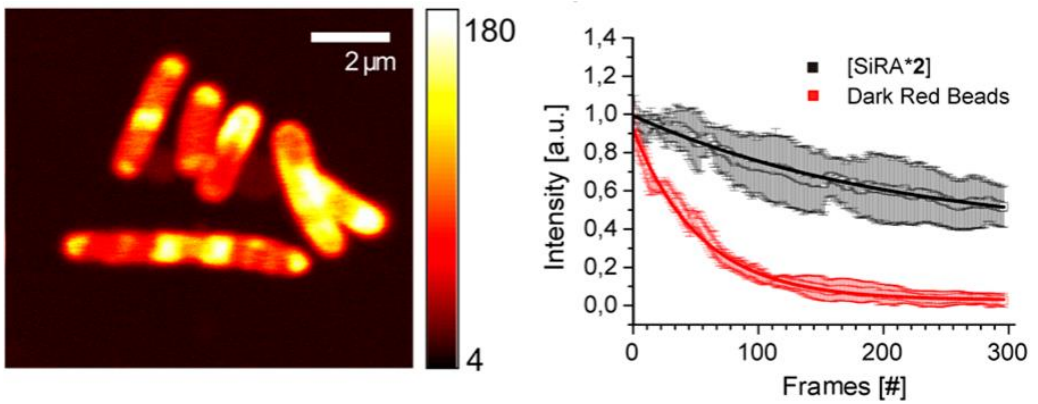
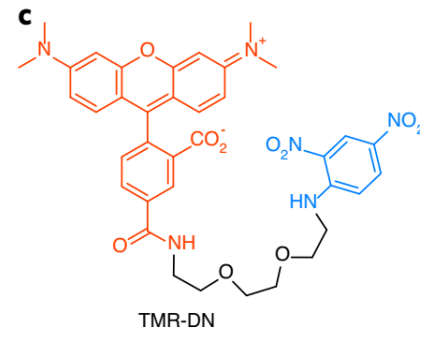
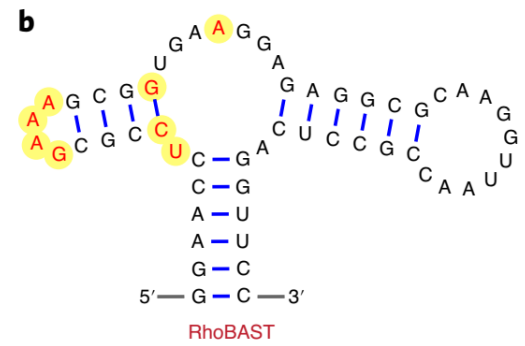
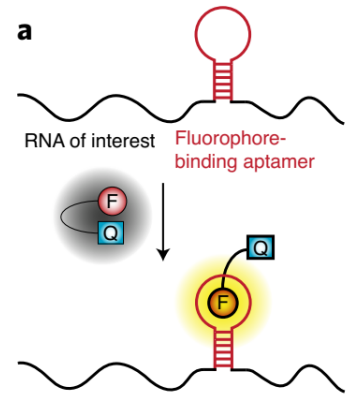
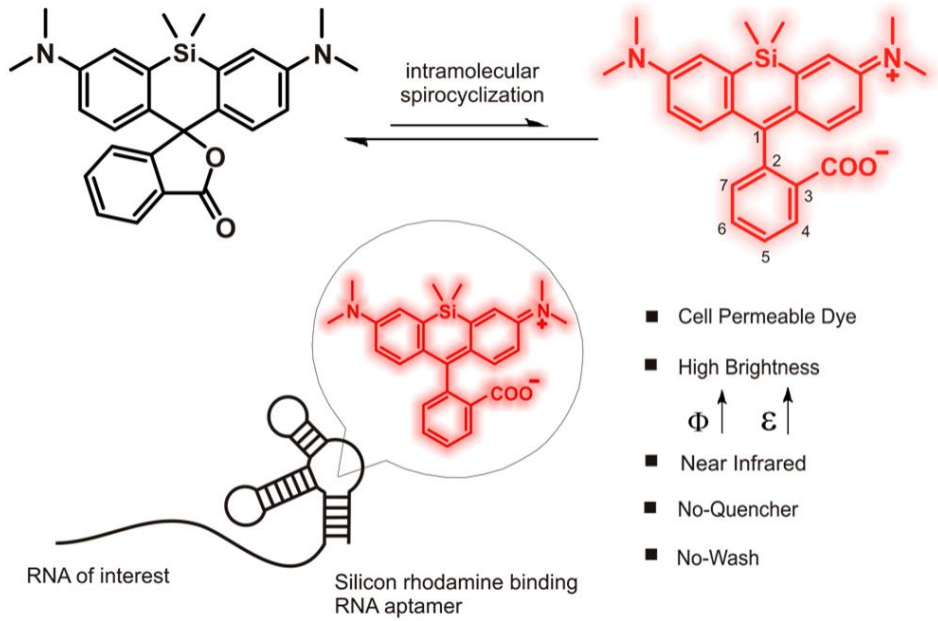


Nature Chemical Biology 2017, 13, 1195-1201



Chem. -Eur. J., 2019, 25, 1931-1935

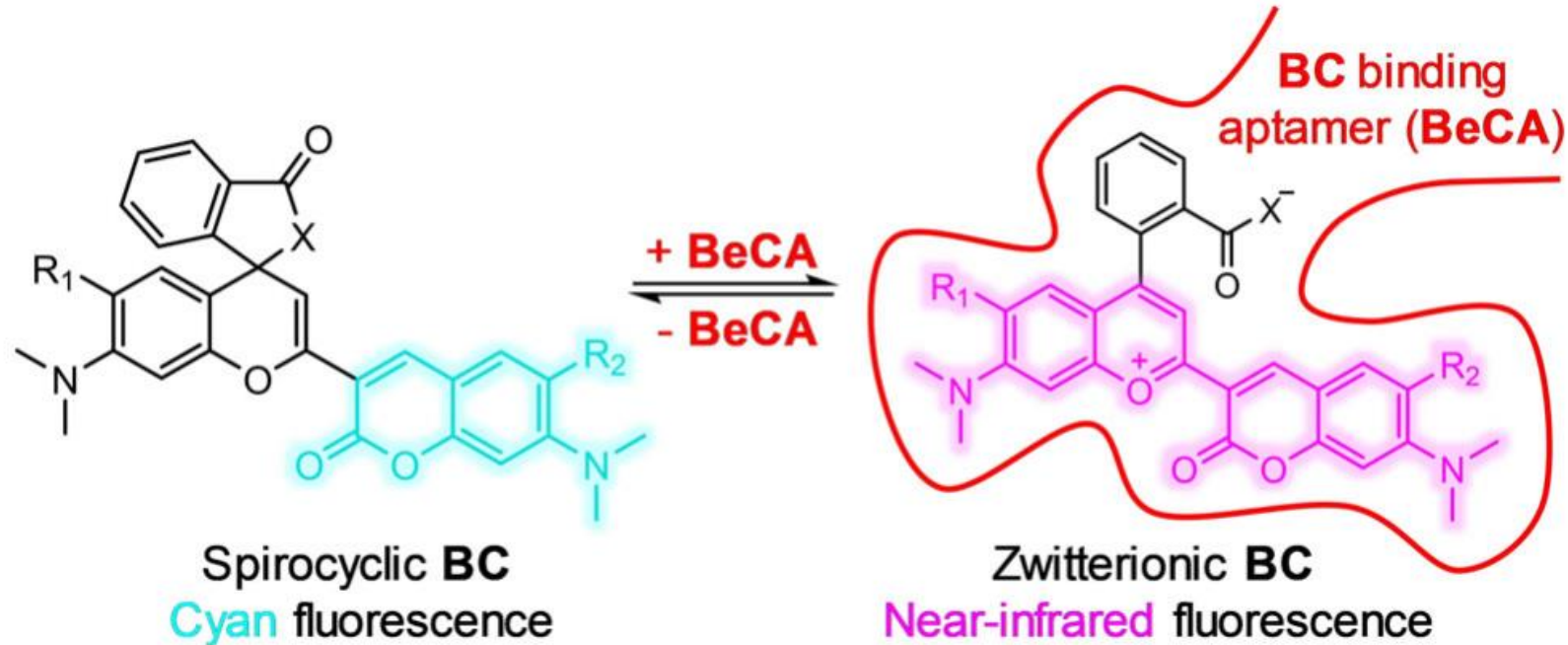
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Nature Biotechnology 2021,
39, 686–690

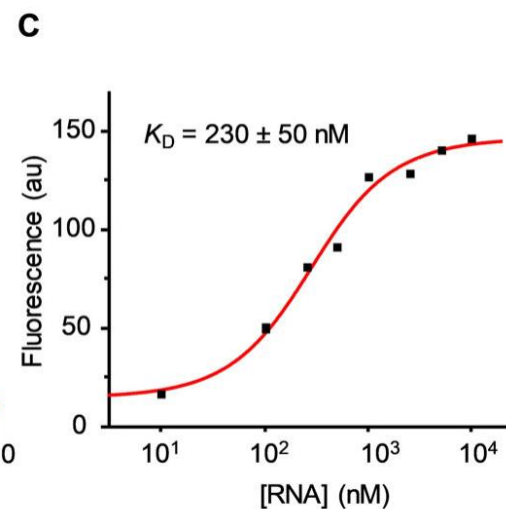
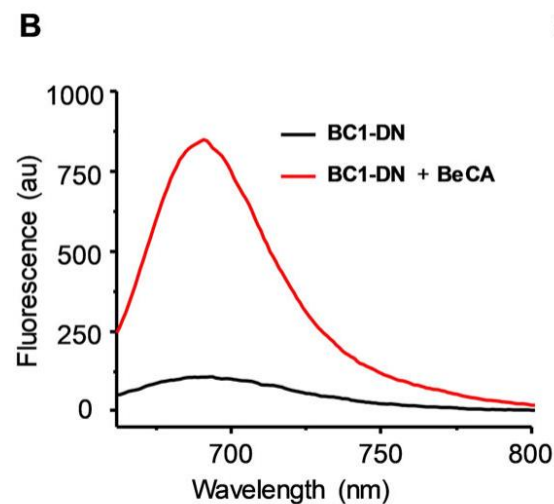
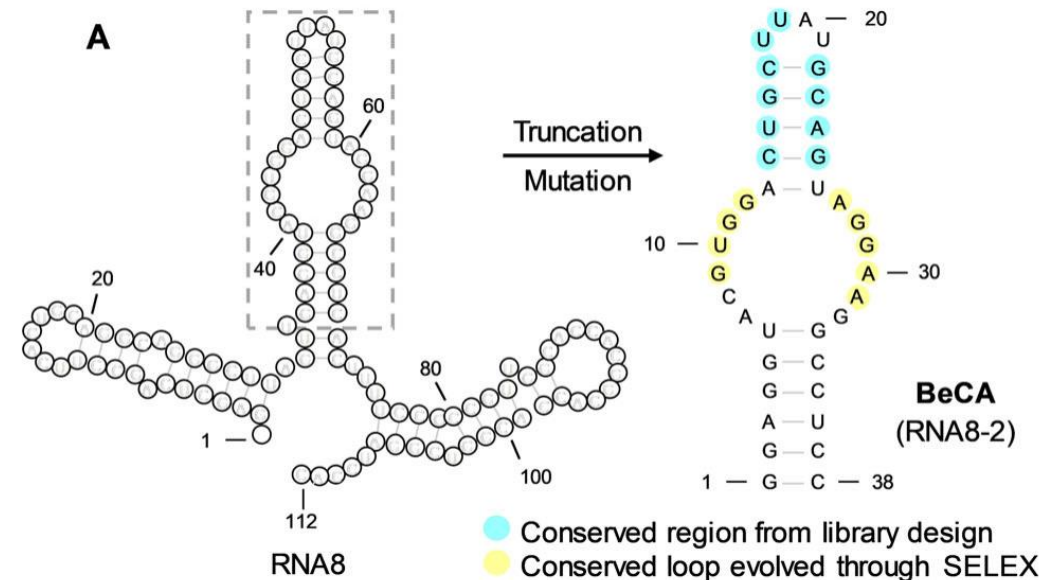
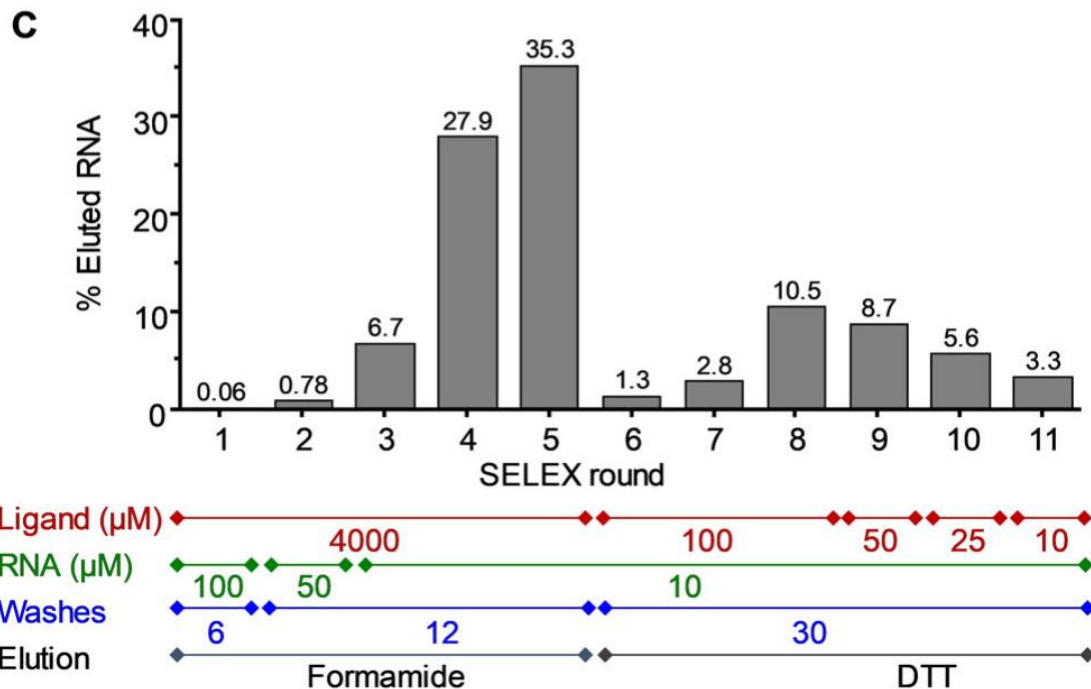
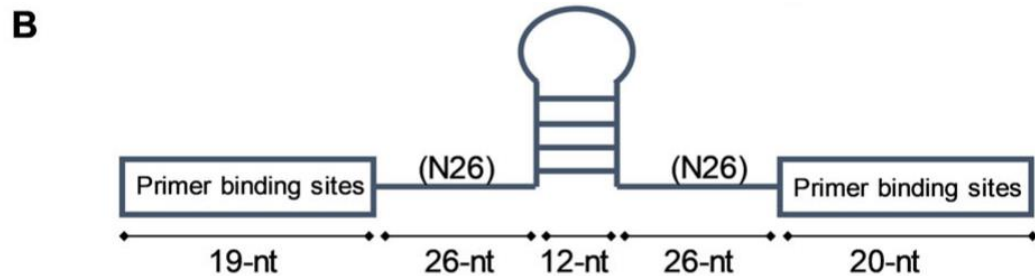
J. Am. Chem. Soc. 2019, 141, 7562–7571

Introduction

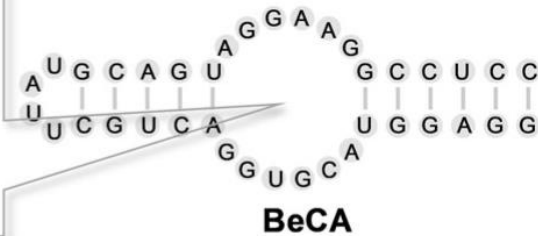
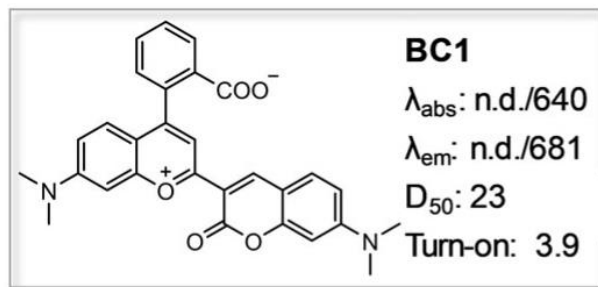


Unfortunately, all FLAPs reported **so far are based on a single-color fluorescence turn-on**. In this work, to address these issues, we report the evolution, characterization, and application of a novel colorshifting NIR-fluorescent aptamer-fluorophore module based on spirolactamization of fluorophores for RNA imaging in living cells.

Result and Discussion

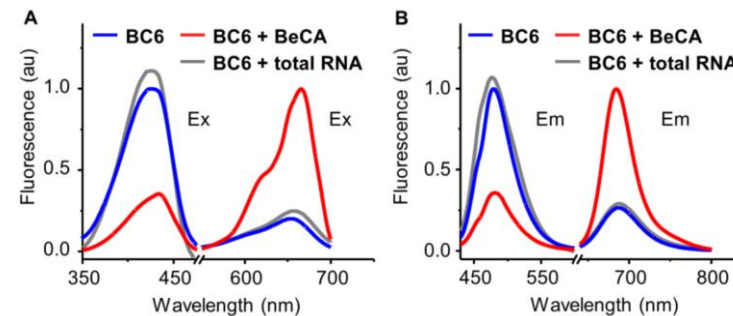
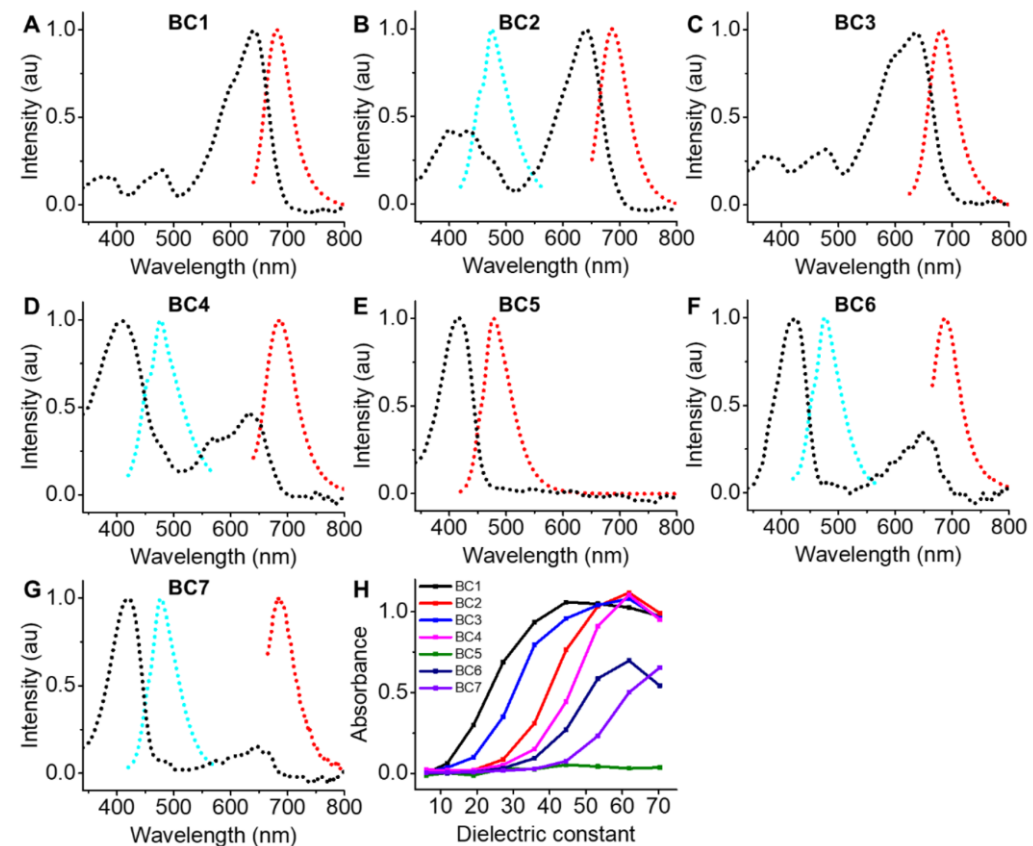
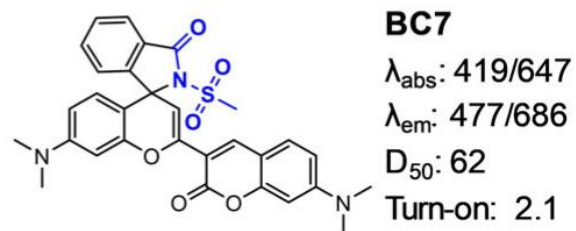
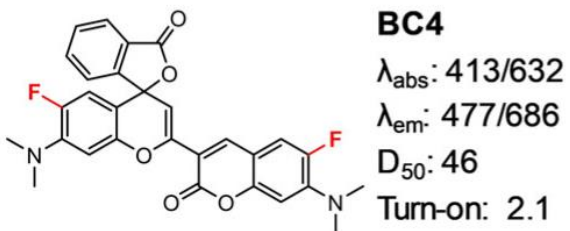
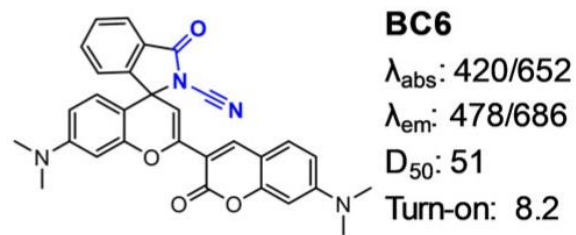
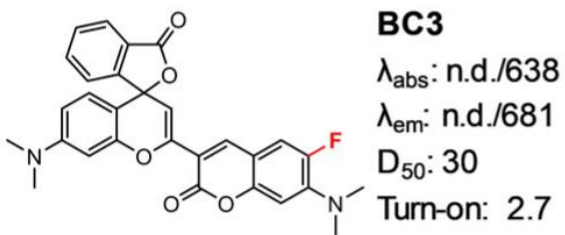
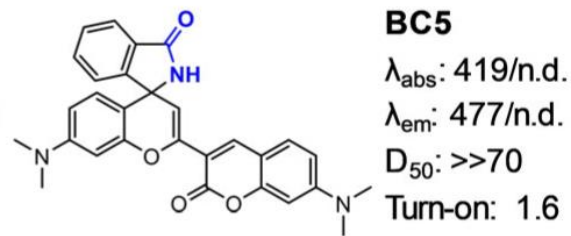
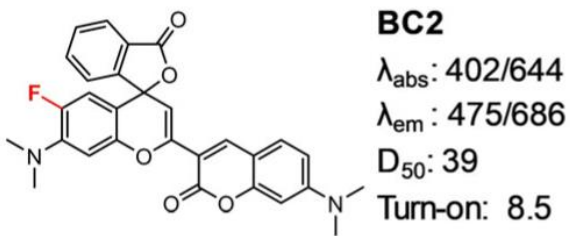


Result and Discussion

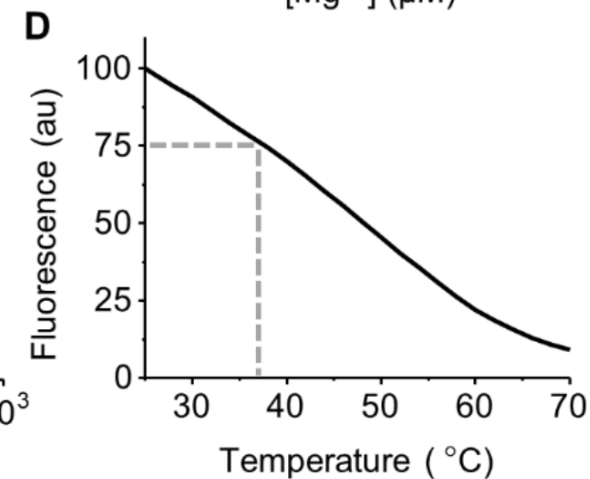
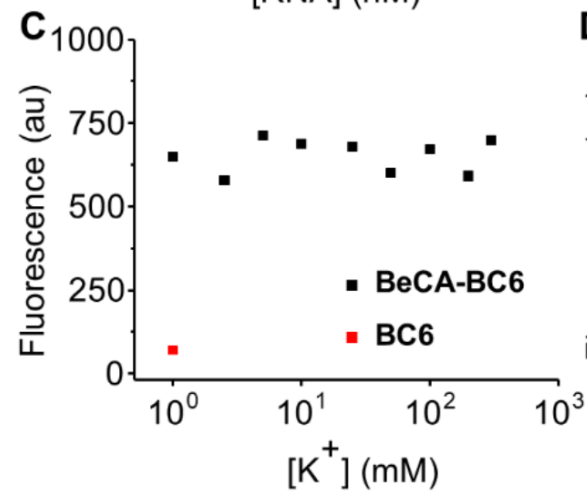
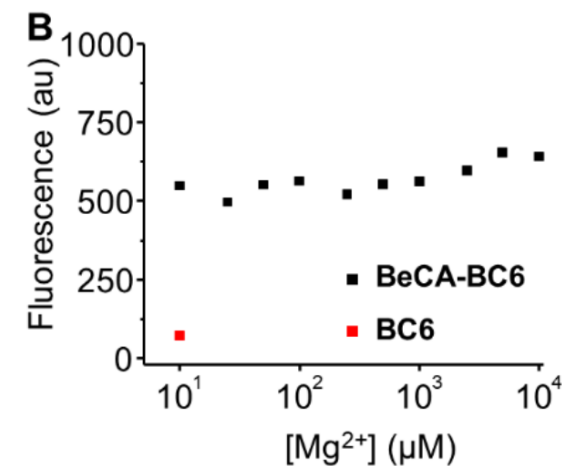
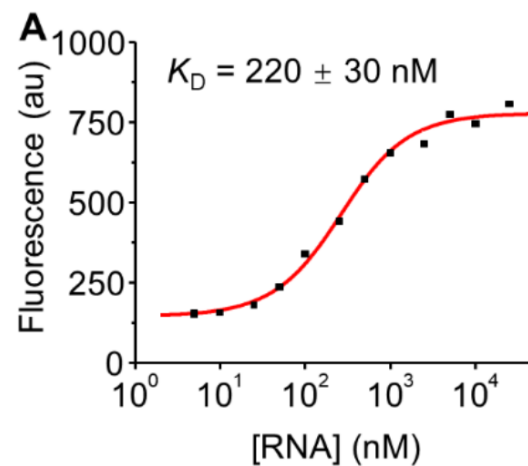
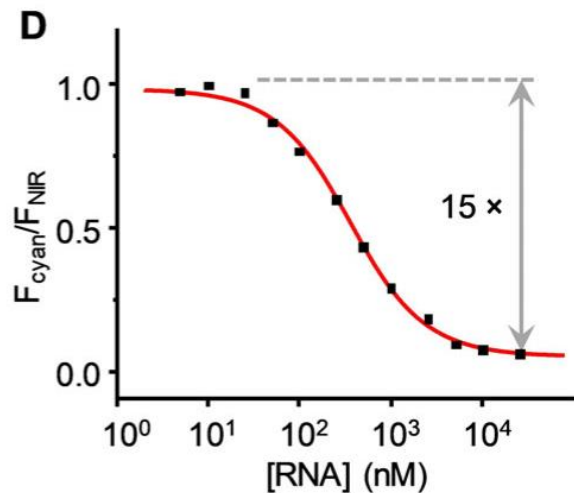
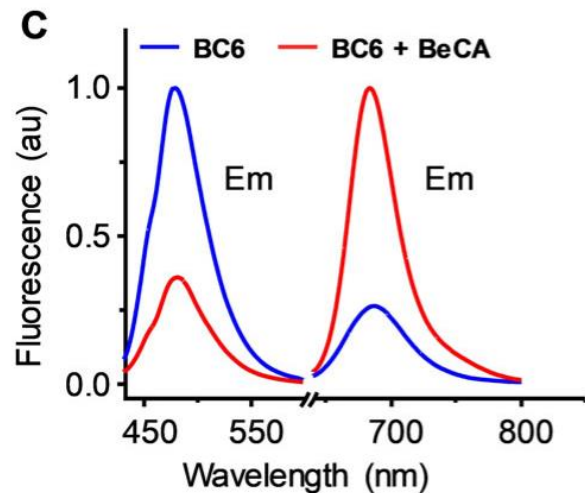
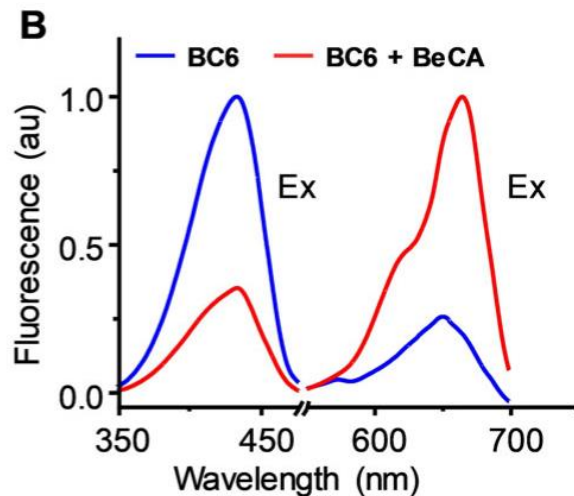
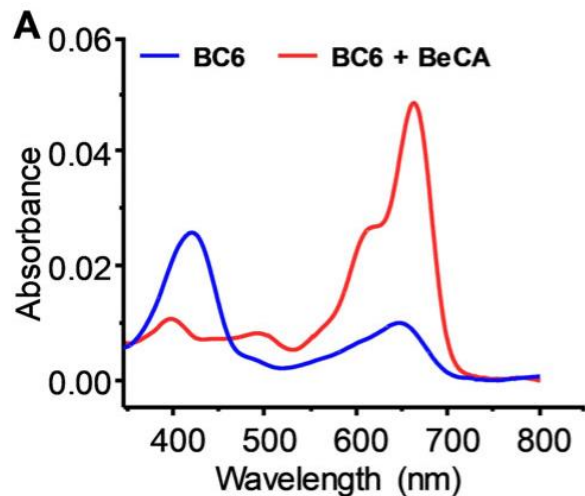


Fluorination

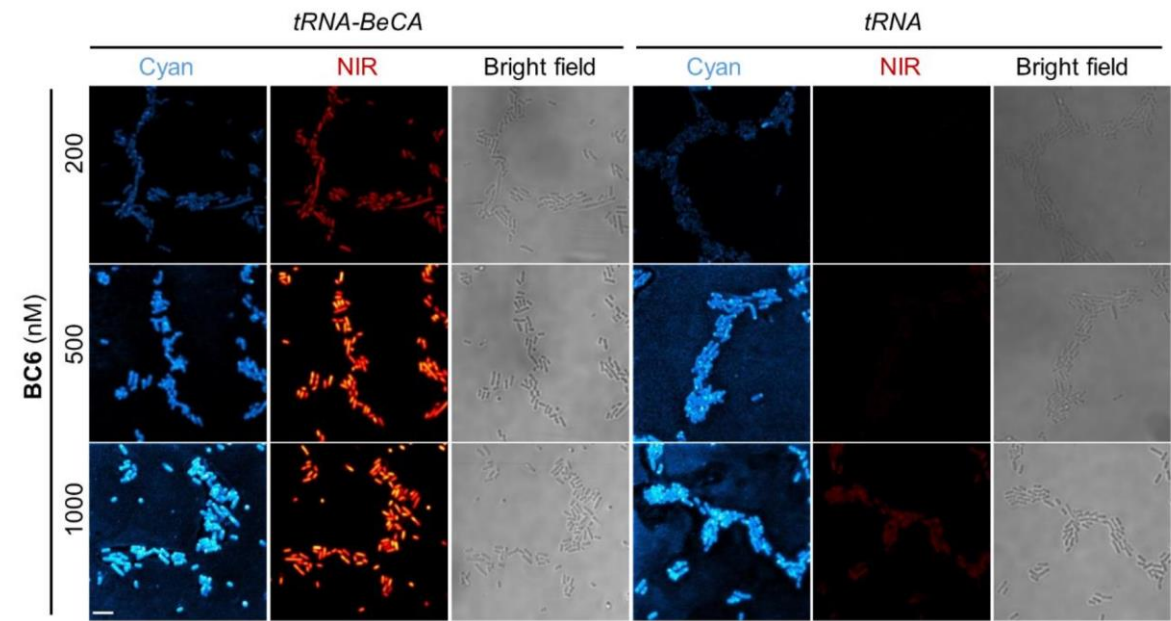
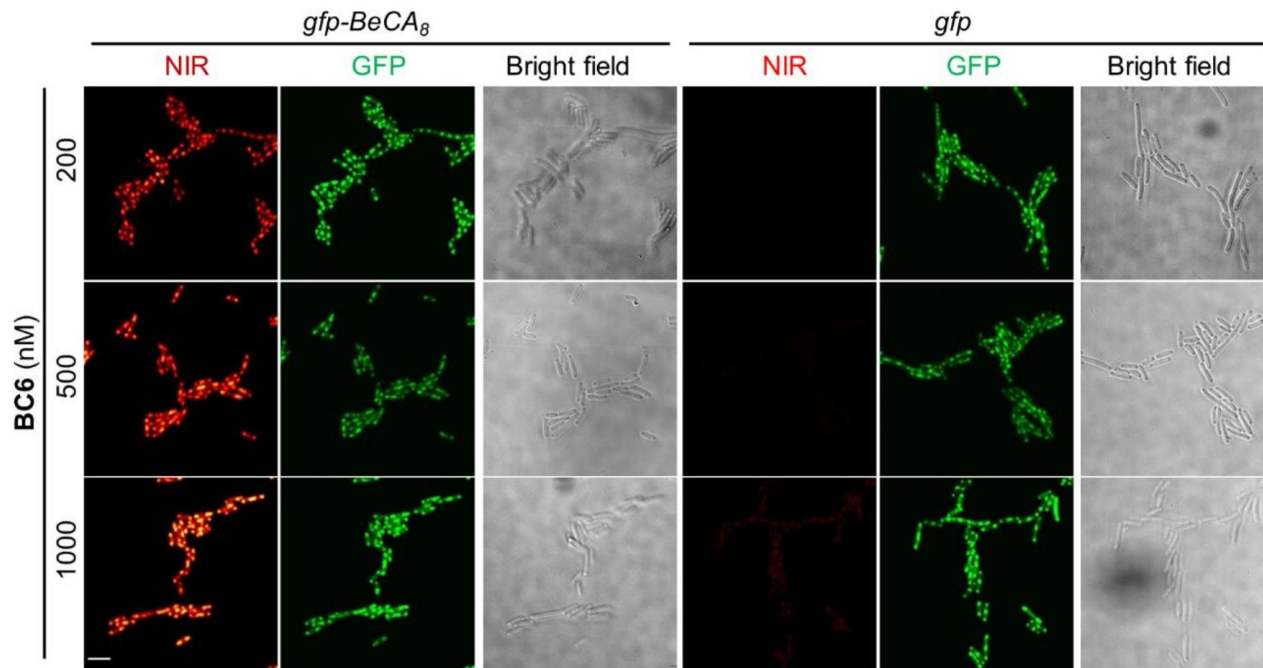
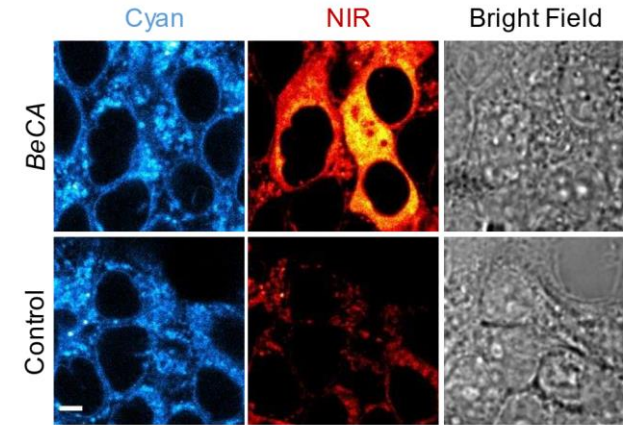
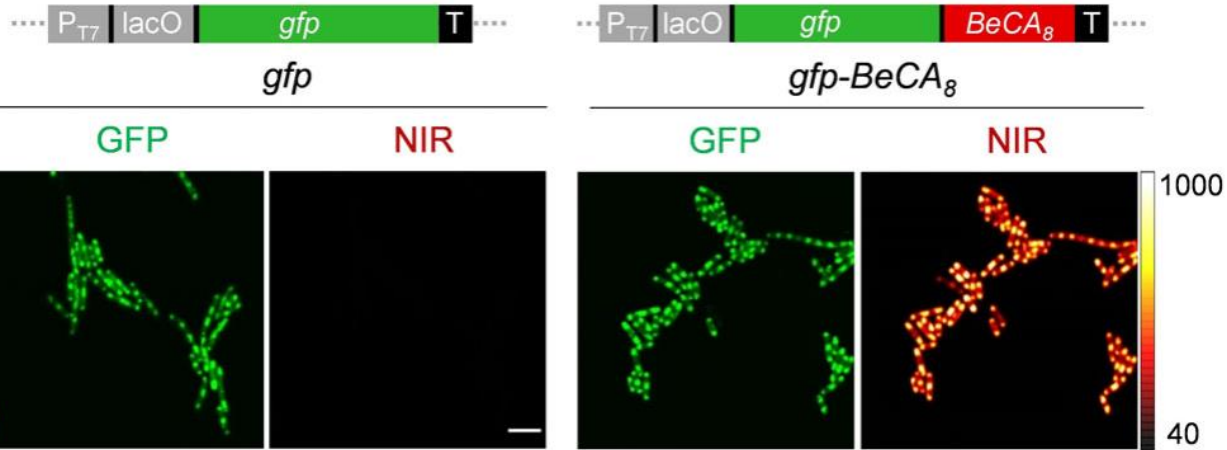
Amidation



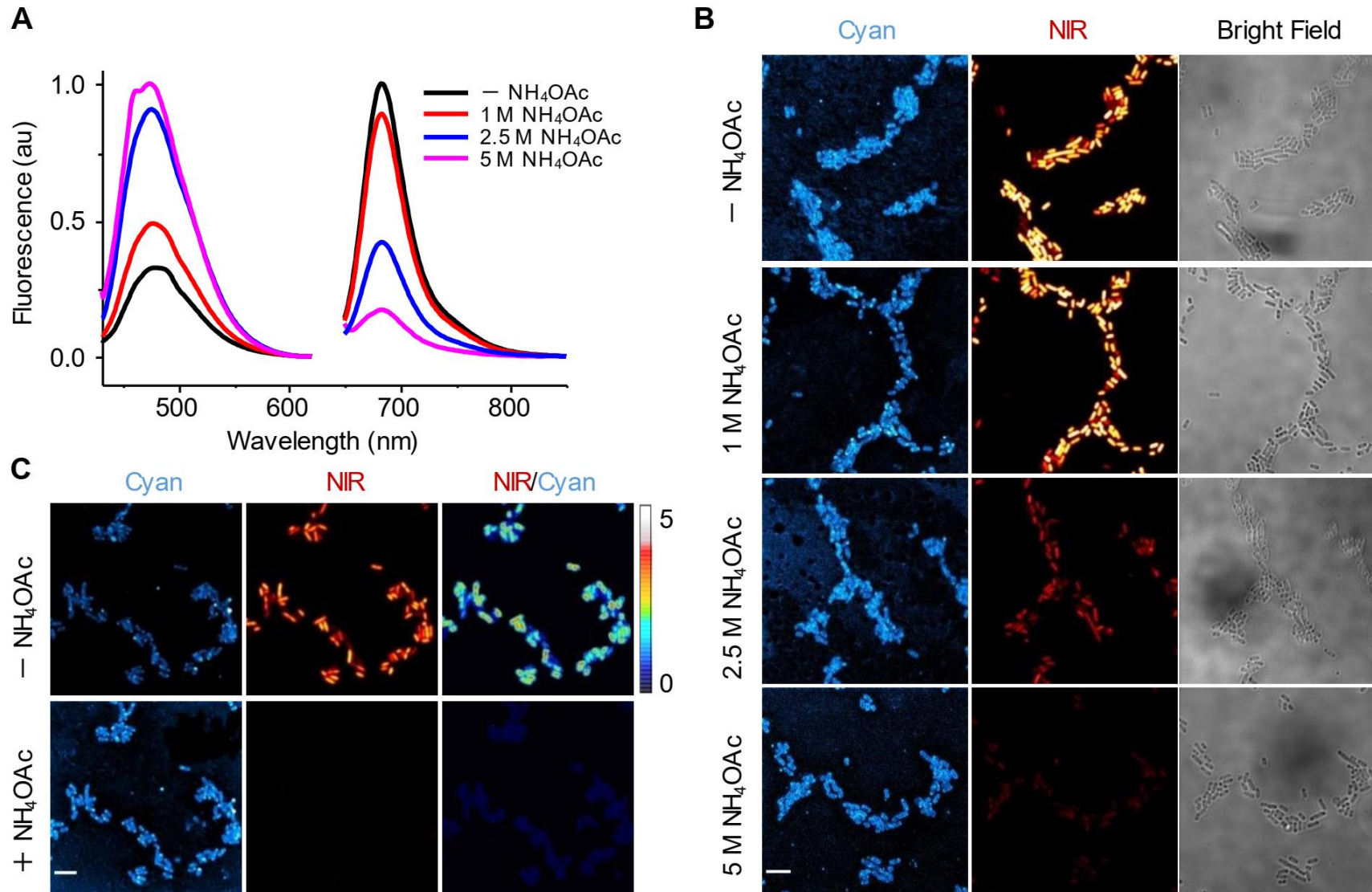
Result and Discussion



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