Universität Basel

Swiss Nanoscience Institute

SNI SWISS NANOSCIENCE INSTITUTE
EINE INITIATIVE DER UNIVERSITÄT BASEL UND DES KANTONS AARGAU

Innovative Catalytic Strategies to Combat Cancer

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Project description Within this PhD project, it is proposed to engineer mammalian cells with an artificial metalloenzyme (ArM). Such ArM may display bio-orthogonal catalytiyc properties that can operate in a complex cellular environment. Careful design of the ArMs-catalyzed reaction will allow to uncage a substrate to afford a product that can exert its function within a cell. The cargo resulting from the ArM-catalyzed reaction may serve different purposes within the cell which we propose to investigate within this project.

Thus far, only a limited number of transition-metal catalyzed reactions have shown compatible with a cellular environment. To complement these reactions, the Ward group has pioneered several catalytic strategies that lead to the uncaging of various fluorescent probes in the presence of cells. Reactions include: olefin metathesis, transfer-hydrogenation, allylic substitution, hydroamination reactions, etc. In the course of his/her PhD, the researcher will work in a highly stimulating environment at the interface between chemistry, biology and medicine. The work will be carried out in close collaboration between the Ward and Fani groups.

In the long-term, we anticipate that such catalytic strategies may be used to eradicate cancer by targeting the ArM to the cancer cells, by endowing the ArM with an antibody that accumulates in diseased cells/organs. Following administration of the ArM, a caged drug will be adminstered, thus leading to the preferential release of the drug where the ArM has accumulated.

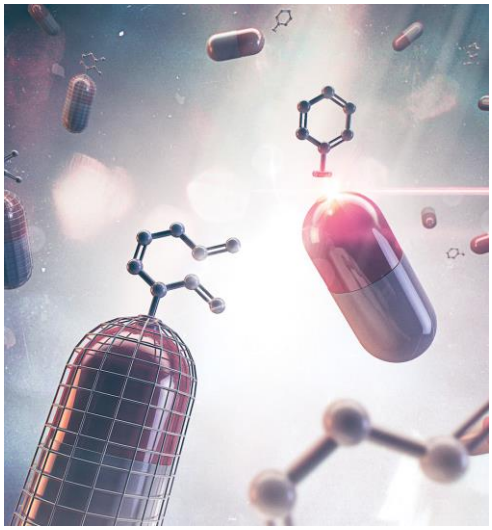

Figure 1. Artistic-rendering of a ruthenium-catalyzed olefin metathesis that an be used to release a caged-cargo, as a result of ring-closing metathesis, followed by a spontaneous 1,4-elimination. This reaction will be studied in a cellular environment.

We expect candidates for the position to have a relevant experimental background in organic synthesis as well as in any of the following: mammalian cell-culture, molecular biology, flow cytometry and FACS, high-througput experimentation. The selected PhD candidate will become a junior member of the SNI and benefit from personal support, a strongly interdisciplinary social environment, training in soft skills offered by the PhD program and many internal SNI events.

Applications should be made online at: phd.nanoscience.ch

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