

Abstract

Charles University in Prague

Faculty of Pharmacy in Hradec Králové

Department of Pharmaceutical Chemistry and Drug Control

Student: Kristína Prokešová

Supervisor: doc. PharmDr. Miroslav Miletín, PhD.

Consultant: Dr. Richard Wombacher

Title: Synthesis of “Chemical Tags” and their application for selective protein labelling

This diploma thesis is aimed on the synthesis and application of chemical tags. In theoretical part, protein labelling in general is discussed and fluorescent proteins, as routinely used technique for protein tracking, are shortly presented. The greatest attention is dedicated to chemical tags which consist of genetically encoded protein or peptide tag fused to the protein of interest (POI) and from a small fluorescent molecule which labels the POI-tag fusion. Particular representatives with their advantageous and disadvantageous properties are mentioned and super-resolution microscopy and calcium imaging, as applications of chemical tags, are explained. Experimental part is divided into chemical synthesis and biological methods. In synthetic part, four precursors of chemical tags have been prepared – two precursors of TMP-tag small molecule and two precursors of a chemical calcium dye. These precursors can be connected to create a new TMP-tag applicable for calcium imaging. One new molecule has been prepared – Halo tag small molecule – and successfully used for live cell protein labelling experiment in biological part of the thesis.