IPAP18 Innovations in Pharmacy ADVANCES & PERSPECTIVES

Salamanca Congress 24-28 Sept.

#IPAP18 Posters

CONSTRUCTION, CHARACTERIZATION AND EVALUATION OF CHITOSAN/ZINC SELF-PROPELLED MICROMOTORS FOR DRUG DELIVERY SYSTEMS

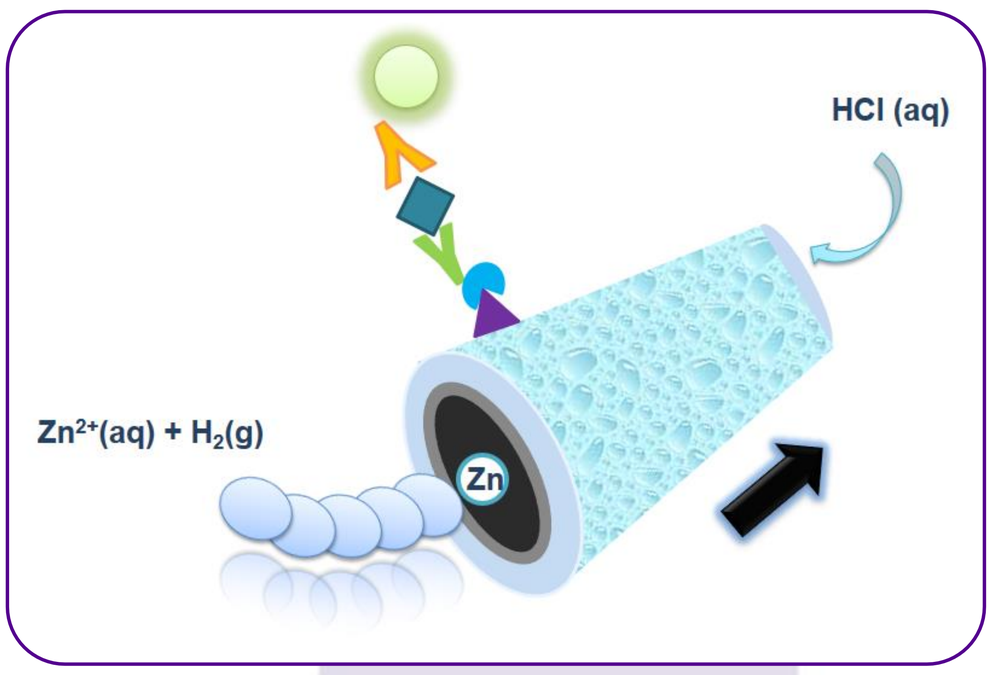
Authors: **Sánchez Gómez Sara**, Molinero Fernández Águeda. Department of Analytical Chemistry, Physical Chemistry, and Chemical Engineering; University of Alcalá. This work has been financially supported by the NANOAVANSENS program from the Community of Madrid (S2013/MIT-3029) and the Spanish Ministry of Economy and Competitiveness,CTQ 2014-58643-R (A.E.).

INTRODUCTION

Microtubular engines are **self-propelled** molecular machines with **micrometers** dimensions capable of converting chemical energy into **autonomous motion**. Their conical shape, made up of **concentric-multiple layers**, assists in unidirectional bubble propulsion as a result of the fuel catalytic decomposition present in the medium by the metal located in the inner layer. Their speed and propulsion power make them **excellents vehicles** to perform different biopharmaceutical applications like **controlled drug delivery systems**.

OBJETIVE

The main aim of this bachelor thesis is to fabricate **microtubular engines** from biocompatible materials such as **chitosan** and **zinc**; and to evaluate their capacity to perform different tasks in biological systems: **propulsion** in acidic medium, **drug transport** and **release** and, finally, **target recognition** and its **capture**.



METHODOLOGY

1. FARBRICATION OF MICROMOTORS
2. FLUORESCEIN ENCAPSULATION
3. FLUORESCEIN RELEASE
4. SPECIFIC ANTIBODY FUNCTIONALIZED MICROMOTORS

RESULTS

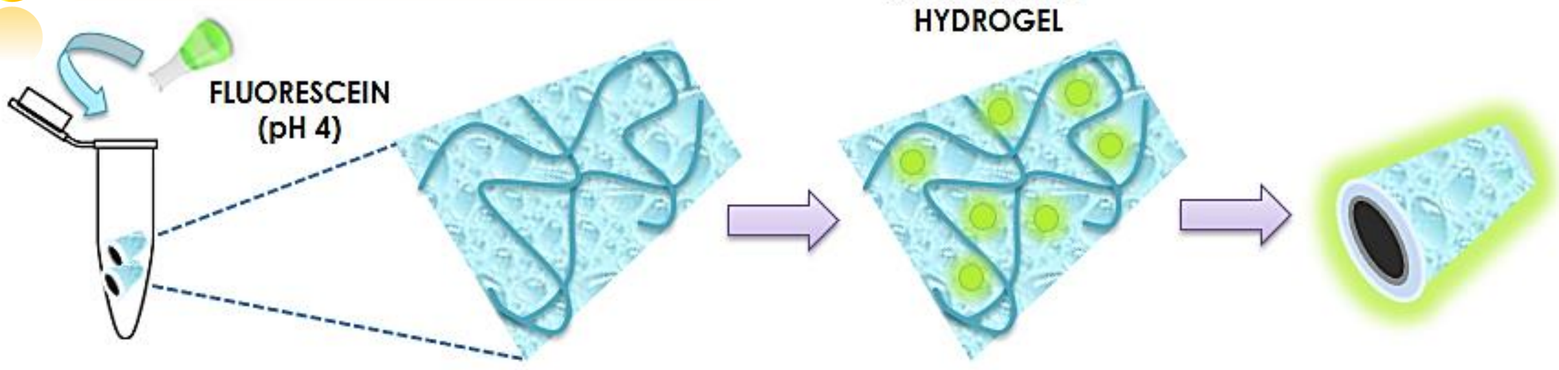
1. FABRICATION OF MICROMOTORS

Electrodeposition conditions: - 8mA 40 mins

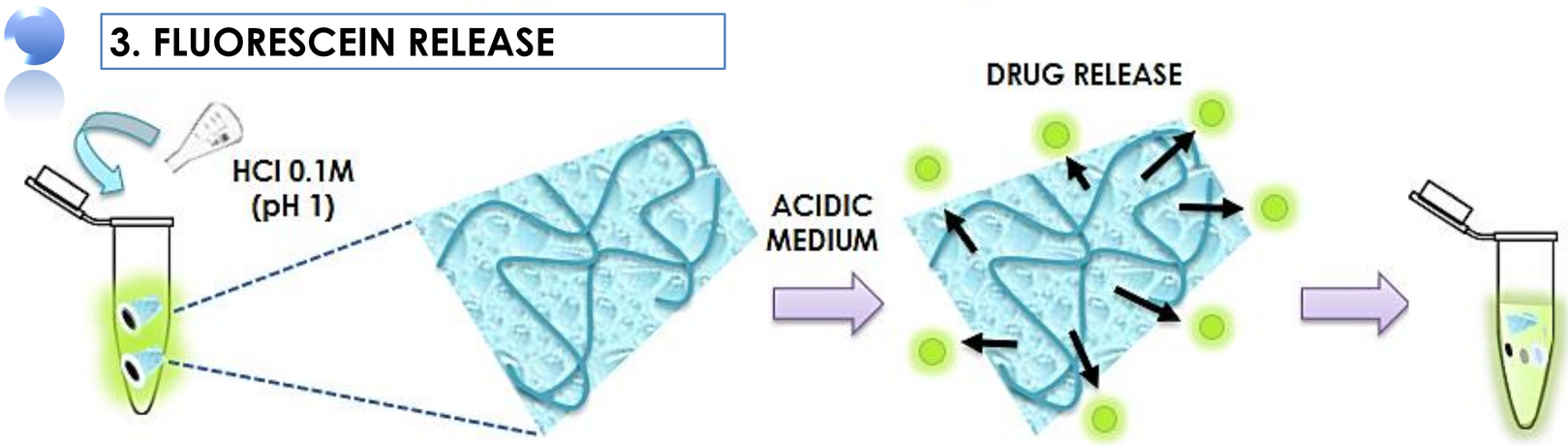
Speed: 50 ±10 μm/s (HCl 0,1M pH 1.0)

33 ±10 μm/s (simulated gastric fluid)

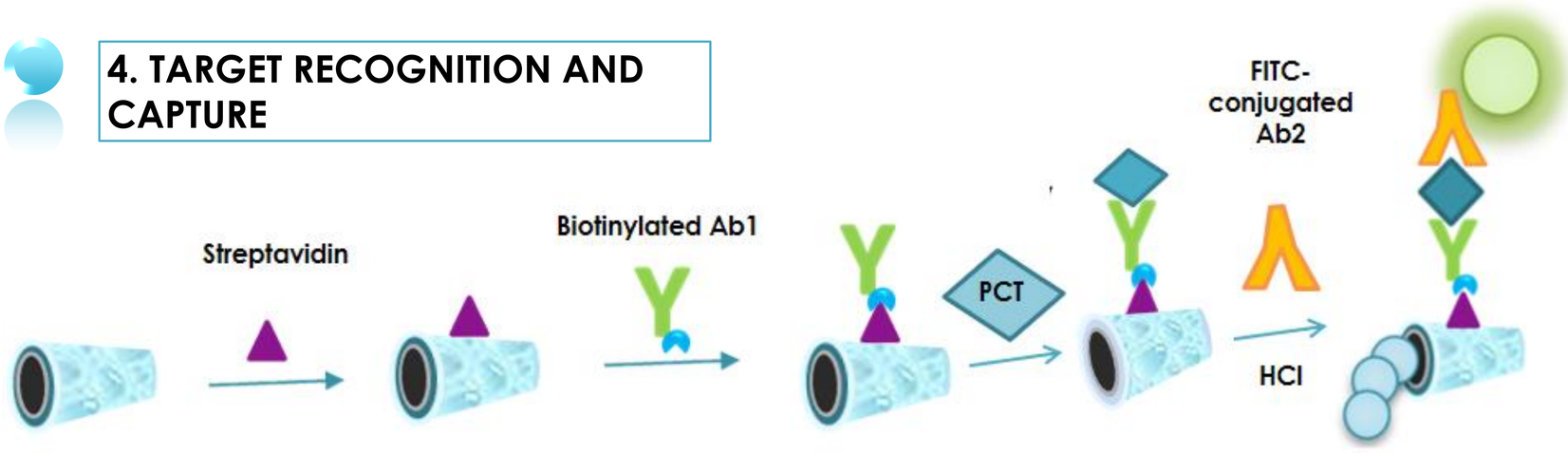
2. FLUORESCEIN ENCAPSULATION



3. FLUORESCEIN RELEASE



4. TARGET RECOGNITION AND CAPTURE



CONCLUSIONS

Chitosan/Zinc micromotors have been **successfully built**. These micromotors have **potential functionalities**, including **efficient propulsion** when they are exposed in acidic medium; **drug transport and release** by the swelling behaviour of chitosan´s hydrogel; **high encapsulation efficiency** and **great time-release drug**, and finally, **target recognition** and its **capture** in gastric enviroment. This study represents an **early approach** for the potential bioapplication of chitosan/Zn micromotors as controlled drug delivery systems which will lead to the **improvement of pharmacological therapies** (enhancing therapeutic efficacy and reducing side effects of oral drugs).