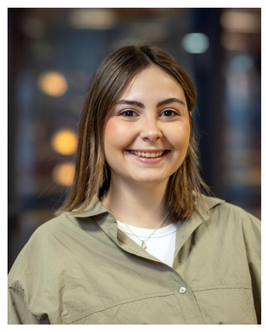
# CYTOSKELETON STABILIZED ARTIFICIAL CELLS AND THEIR DYNAMIC BEHAVIOUR



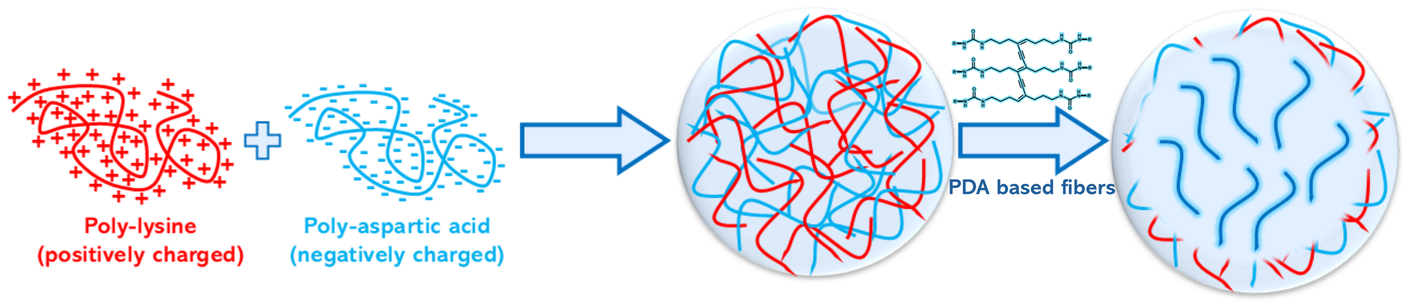
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https://doi.org/10.17952/38EPS.2026.P545

## INTRODUCTION

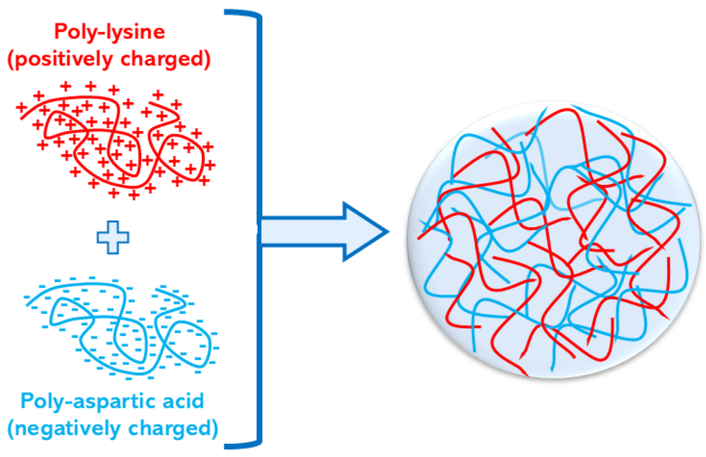
The development and characterization of **artificial cells** is a research field of high potential because these artificial systems can **mimic features and functions of life**, being able to exchange biomolecules with each other or respond to changes in their environment as pH or temperature, which makes them suitable for **biomedical applications.**[1]



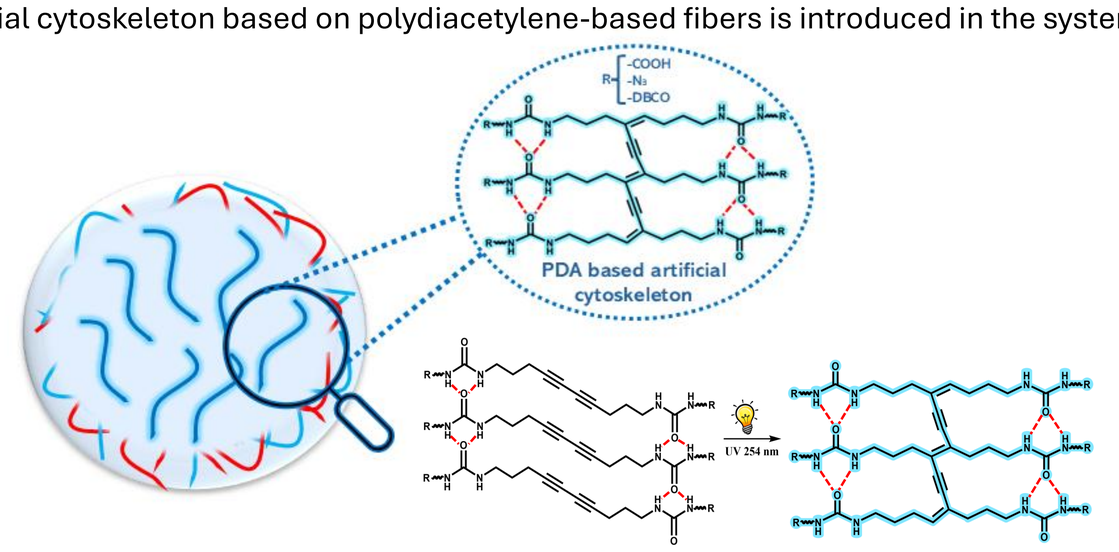

The **objective** of this project is to develop an artificial cell system based on **phase-separated polypeptides** and introduce inside it an **artificial cytoskeleton** based on **polydiacetylene fibers.**[3]

## METHODOLOGY

Our artificial cells are originated by mixing of two opposite charged polypeptides: poly-lysine and poly-aspartic acid, leading to micron-sized droplets.

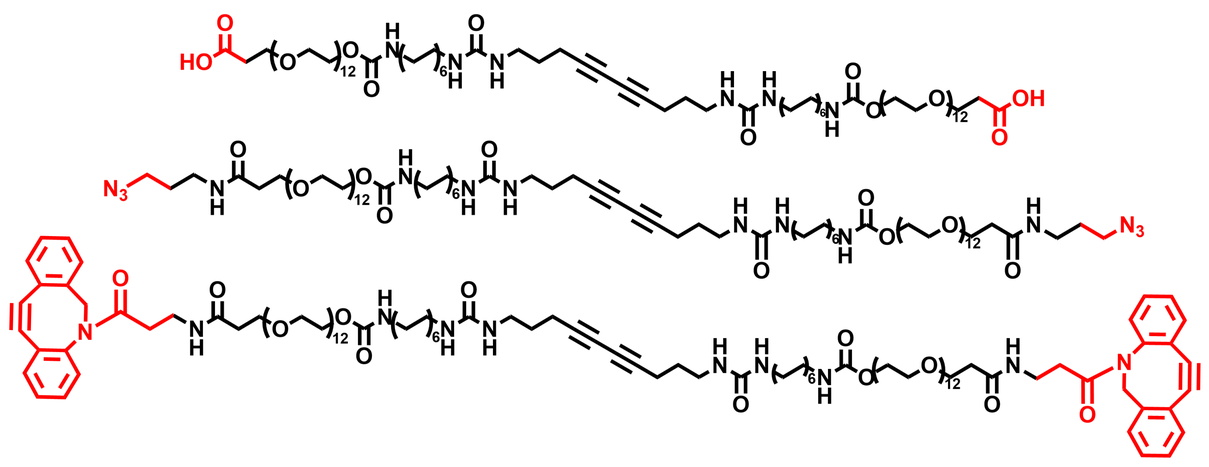



An artificial cytoskeleton based on polydiacetylene-based fibers is introduced in the system.[3,4]




The self assembly of the fibers is possible due to the hydrogen bonds between the bis-urea and the carbonyl groups, and the π-π stacking of the diacetylene backbone.[3,4]

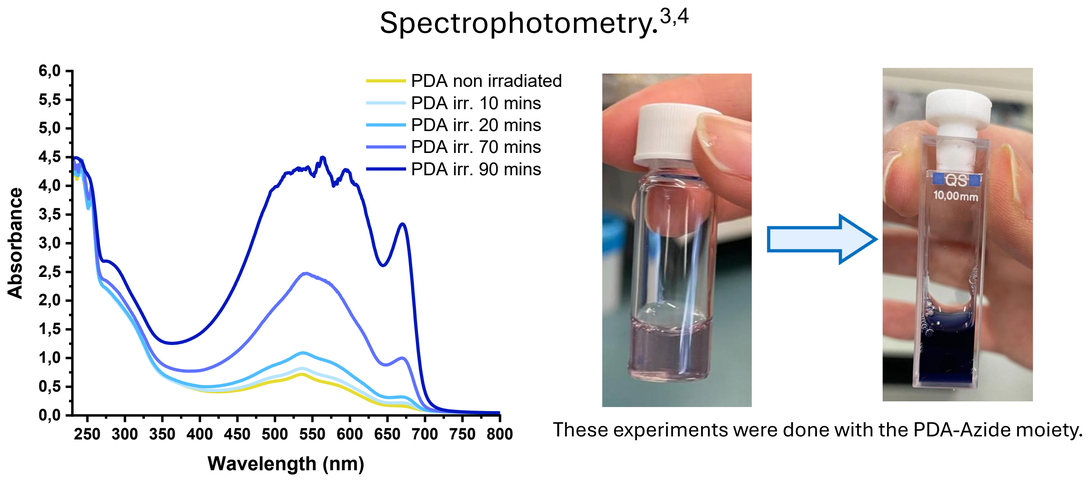
The photopolymerization induces a conjugated system, which stabilizes the fibers self-assembly and presents self-fluorescence.[3,4]



The terminal groups of these molecules allow them to be functionalized with peptides and small biomolecules such as DNA, which will be explored in the future.[3]

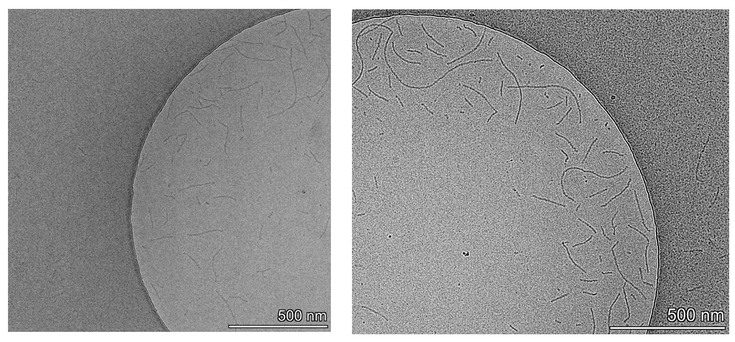
## RESULTS

The photopolymerization of the fibers was achieved, showing a color change from transparent to blue, which was also analyzed by UV-Vis Absorbance Spectrophotometry.[3,4]

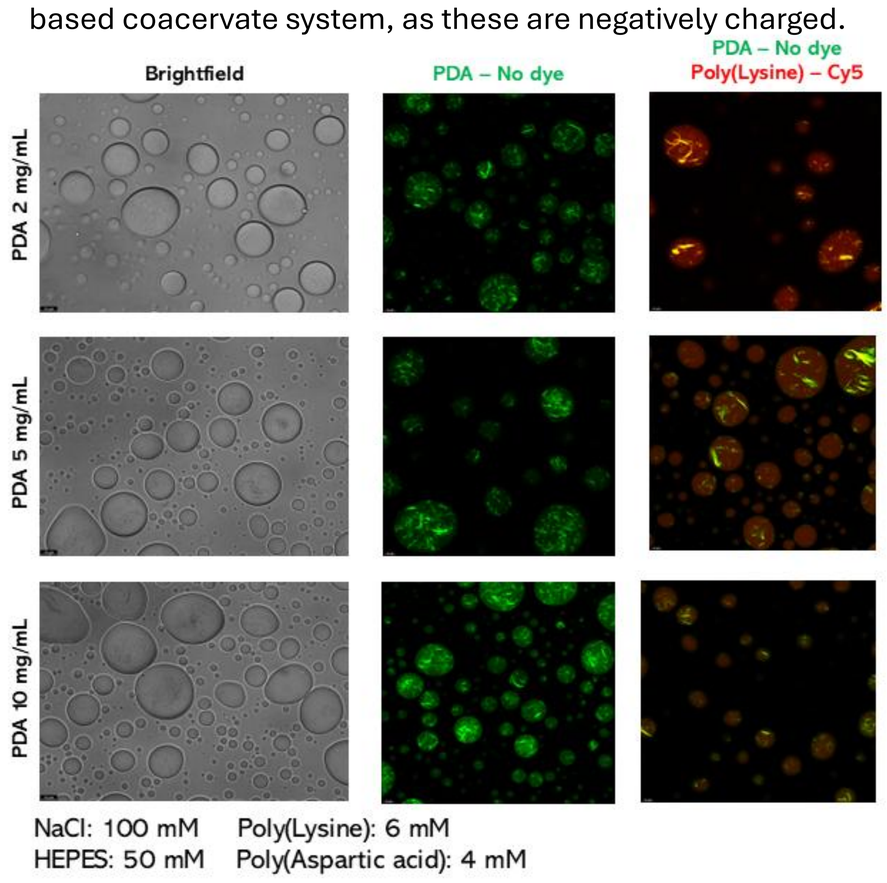



These experiments were done with the PDA-Azide moiety.

The obtained morphology was characterized by **Cryo-TEM**. PDA-COOH fibers are approximately 6 nm thick and 100-400 nm long.[3]




PDA-Azide fibers were successfully introduced into the positive polypeptide-based coacervate system, as these are negatively charged.




## CONCLUSIONS AND OUTLOOK

- ✓ **Polydiacetylene-backboned molecules self-assemble** into **fibers** by hydrogen bonding and π-π stacking , followed by stabilization by photopolymerization.
- ✓ The **photopolymerization** of the **polydiacetylene-based molecules** leads to a color change and autofluorescence of the fibers.
- ✓ **Polydiacetylene fibers** have been successfully introduced in the **polypeptide-based coacervate system.**
- ✓ Introduction of biomolecules into the artificial cell system will be performed in the future by linking them to the PDA fibers.

### REFERENCES

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This project has been founded by ERC with the grant PRO-ARTIS-ERC-2023-ADG-ST-101141866-ST