

Book of Abstracts **IN²UB ANNUAL MEETING**

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in²

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The Thymidylate synthase enzyme (TS) is widely studied as an anti-cancer target because of its role in the synthesis of dTTP. Treatment with TS inhibitors (e.g. 5-FU) can lead to tumour resistance through overexpression of TS, either by chromosome aberrations or by alteration of molecular mechanisms that regulate gene expression of this gene. It has been proposed that G-quadruplex nucleic acid sequence motifs may regulate translation as well as transcription. Therefore, in the present work, we have explored the incidence of G-quadruplex motifs in the 5' untranslated regions (5'-UTR) of the mRNA of the thymidylate synthase gene as potential targets in cancer treatment. By using the OGRS mapper, a software for searching putative quadruplex forming G-rich sequences, we found a predicted G-quadruplex (G4). This prediction was confirmed by circular dichroism and UV melting measurements for the RNA sequence. In consequence, and to develop new therapeutic agents that could overcome resistance to TS inhibitors, we designed a Polypurine Reverse Hoogsteen hairpin (HpTYS-64-T-PPRH) against the complementary strand of this G4 sequence.

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PI3. FROM BIOMASS TO SUSTAINABLE NEW MATERIALS: NOVEL ASPECTS ON CELLULOSE UTILIZATION

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Nowadays, enormous efforts are being done in the scientific community in order to develop sustainable alternatives to petrol derivatives like plastics for all kinds of applications, including packaging, building blocks, or biomedical devices, among others.

In this context, cellulose is an extraordinary renewable material for both its versatility and its abundance; it accounts for more than one third of the existing organic carbon sources on earth.

Considering this, as a group of Microbial Enzymes for Industrial and Environmental Applications, we are working on the biotransformation of natural polymers like vegetal cellulose, including the development of enzymes that catalyse its modification, hydrolysis, and/or synthesis. In addition, we are exploring the potential of bacterial cellulose, as an innovative source for new biomaterials, including its utilization as a platform for anchoring proteins, antimicrobial agents and other functionalization.

We have deep experience on the study of molecular biology of carbohydratases and esterases, and the identification and design of enzymes for biotechnological applications in pulp bleaching and paper recycling, production of biofuels, synthesis of new compounds from wastes, improvement of textile fibers, food industry, and development of new materials based on lignocellulose. With different approaches, we have expanded the toolbox of new enzymes, or their improvement by protein-engineering strategies, available for the community.

We aim at combining basic research with applied studies and innovation, and within this combination, we explore the development of new materials obtained through sustainable processes, and their modification in mild conditions by replacing chemical pollutants with enzymatic components. The developed materials display exceptional physicochemical properties, such as an ultrafine reticulated structure, high crystallinity, high tensile strength, high hydrophilicity and biocompatibility. These unique properties are allowing us to develop new biocomposites and to evaluate their applicability in several fields.

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