



Università degli Studi di Napoli Federico II

PhD in Biotechnology – 36th cycle

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**MATRIX REINFORCEMENT OF HYDROCOLLOID-BASED
BIOPLASTICS**

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Nowadays around 300 million tons of plastic product-derived wastes are produced every year worldwide and barely 7% of such wastes is recycled. Thus 93% goes to landfills or dispersed in the environment¹. It is time to find alternatives to plastics of petrochemical origins by replacing them, at least in part, with biodegradable materials. Hydrocolloid films, made up from polypeptides and polysaccharides, are ideal candidates for replacing conventional polymers in some applications, like food packaging². Starch is an excellent biopolymer, thanks to its film-forming property and its well-defined chemical features³. In this project we propose to use a modified starch, amylose only starch, with improved characteristics, blended with proteins such as secalin or bitter vetch, modified by microbial transglutaminase⁴ to obtain novel hydrocolloid-based films. In order to use these novel bioplastics for active packaging we propose also to incorporate into them active compounds like antimicrobial and pesticides. In fact, besides food sector, these novel bioplastics may be exploited in agriculture as a matrix to deliver pesticides to treat crops and protect them by pathogen attack. Finally, in order to produce also shopping bags we want to reinforce these films with particles and nanoparticles obtained by innovative and efficient techniques, like sol-gel method.

References

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