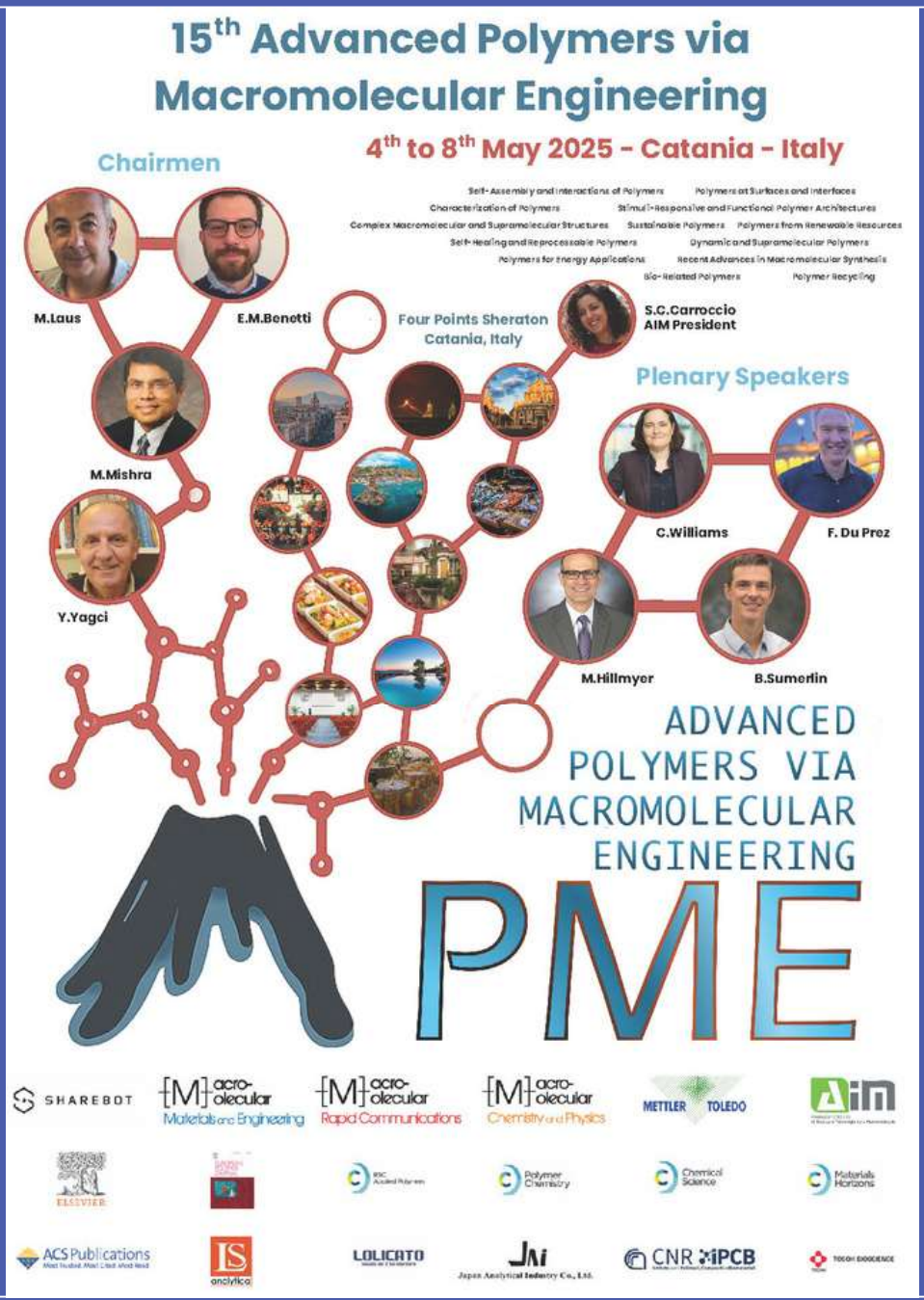
15th Advanced Polymers via Macromolecular Engineering Conference (APME2025)



Book of Abstracts

introduction

15th Advanced Polymers via Macromolecular Engineering Conference (APME25) will be hosted in the fantastic city of Catania (Italy) from 4th to 8th May 2025.
Initiated by M. K. Mishra and Y. Yağci, APME meeting is a major event in the field of Polymer Science with a series of great Conferences such as in Paris (France, 2023), Stellenbosch (South Africa, 2019), Ghent (Belgium, 2017), Yokohama (Japan, 2015), Durham (United Kingom, 2013), Cappadocia (Turkey, 2011), Dresden (Germany, 2009) and Miami (USA, 2007).
APME25 aims at covering all aspects dealing with the smart design of polymers for a wide range of applications

topics

The scope of the meeting will cover all topics in polymer science such as (not limited):

- Recent Advances in Macromolecular Synthesis
- Complex Macromolecular and Supramolecular Structures
- Dynamic and Supramolecular Polymers
- Stimuli-Responsive and Functional Polymer Architectures
- Self-Healing and Reprocessable Polymers
- Polymers from Renewable Resources
- Sustainable Polymers
- Self-Assembly and Interactions of Polymers
- Characterization of Polymers
- Polymer Recycling
- Polymers for Energy Applications
- Polymers at Surfaces and Interfaces
- Bio-Related Polymers

committees

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DEVELOPMENT AND CHARACTERIZATION OF NOVEL ACTIVE BIOBASED MATERIALS BASED ON CELLULOSE ACETATE PROPIONATE INCORPORATED WITH SURFACTANT AND QUERCETIN

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Abstract

The purpose of active packaging is to extend the shelf life of food by actively affecting the packaged product or the ambient conditions inside the packaging[1]. For this reason, it should be noted that the packaging market is developing towards biodegradable active packaging that is safe for the environment and simultaneously prevents unfavourable changes in the biochemical composition of products Currently, as a result of employing modern research methods, novel active packaging materials are being obtained. It should be stressed that some of them comprise biodegradable polymers. Polylactide, chitosan, and a whole range of cellulose derivatives, such as carboxymethyl cellulose and cellulose acetate propionate (CAP), count among the most promising biodegradable polymers used as packaging materials. In the present project, cellulose acetate propionate was chosen to be used as a biodegradable polymer because it is a relatively low-cost polymer derived from renewable resources.

It is well known that microbial incursion occurs even when the food is packaged[2]. This can be attributed to moisture permeability in the packaging materials and other environmental conditions. Therefore, active agents, like antimicrobial components and antioxidants, must be incorporated into the packaging system. These active agents function by enhancing the stability of the product to a greater extent. Active packaging systems intentionally absorb or release substances into food or the environment the food remains in contact with. Compounds required to achieve such an effect may be incorporated into the packaging material. For this reason, compounds characterized by antioxidative properties, such as quercetin, can be introduced into a polymeric matrix. Most active compounds, however, cannot easily be dissolved . Performed analyses allowed us to establish that non-ionic surfactants, such as Tween 80, can significantly influence the dissolution and dispersion of active compounds in a polymeric matrix[3]. It should be noted that Tween 80 has been approved for contact with food by the Food and Drug Administration.

As a result, introducing non-ionic surfactant, namely Tween 80, as a solubilizer and a plasticizer, along with quercetin as an active compound, into CAP-based packaging was successfully accomplished, resulting in unique properties of the obtained material.

Performed analyses allowed to establish that new materials are characterized by significant antioxidative properties that can improve the shelf life of storage food as well as can be used as indicators of biogenic amines and other nitrogen compounds released during meat spoilage.

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[1] Sharma, R.; Jafari, S.M.; Sharma, S. *Antimicrobial bio-nanocomposites and their potential applications in food packaging*. Food Control 2020, 112, 107086.
[2] Al-Tayyar, N.A.; Youssef, A.M.; Al-Hindi, R. *Antimicrobial food packaging based on sustainable bio-based materials for reducing foodborne pathogens: A review*. Food Chemistry 2020, 310, 125915.
[3] Vigneshwari, R., & Dash, S. *Comparative Interaction of Flavonoid Quercetin with Different Tween Surfactants*. ACS Food Science & Technology 2023, 3(5), 969–980.