

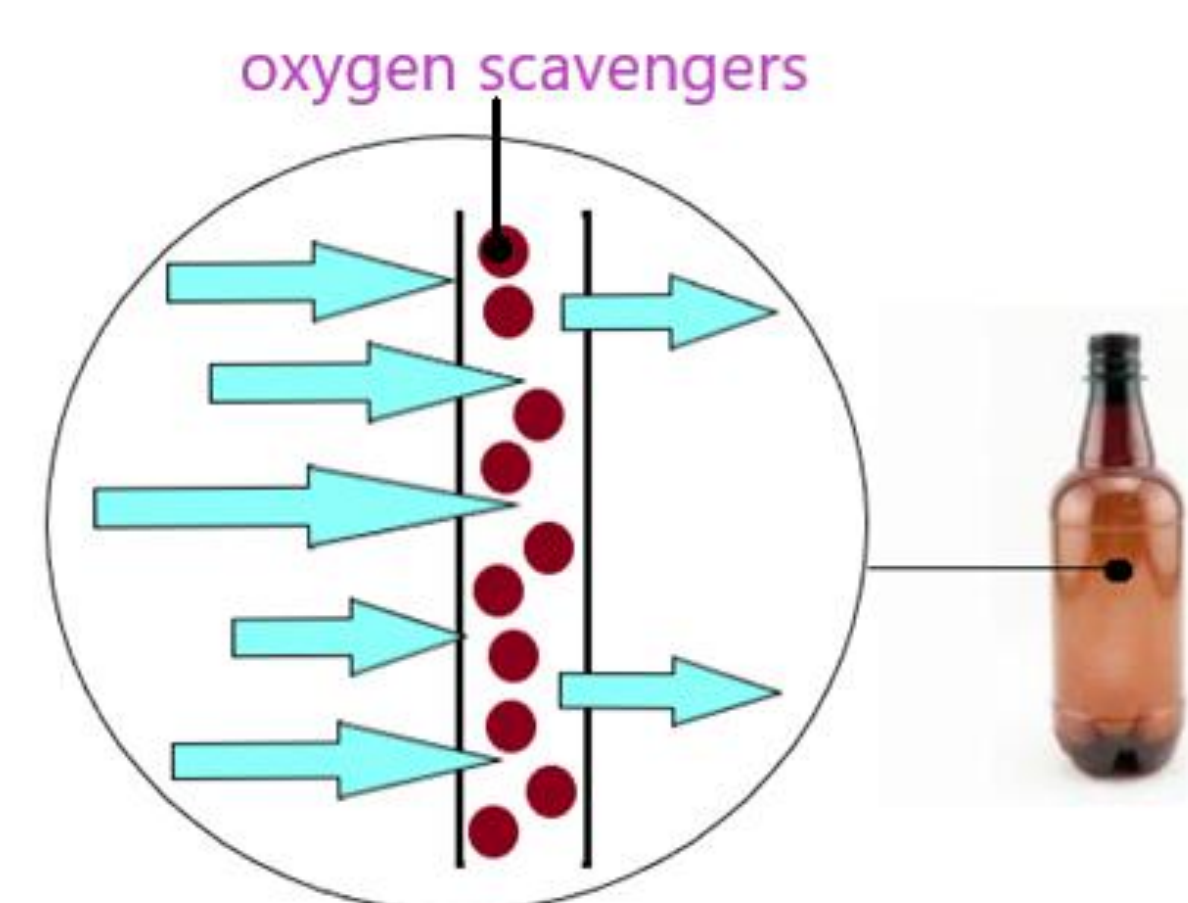
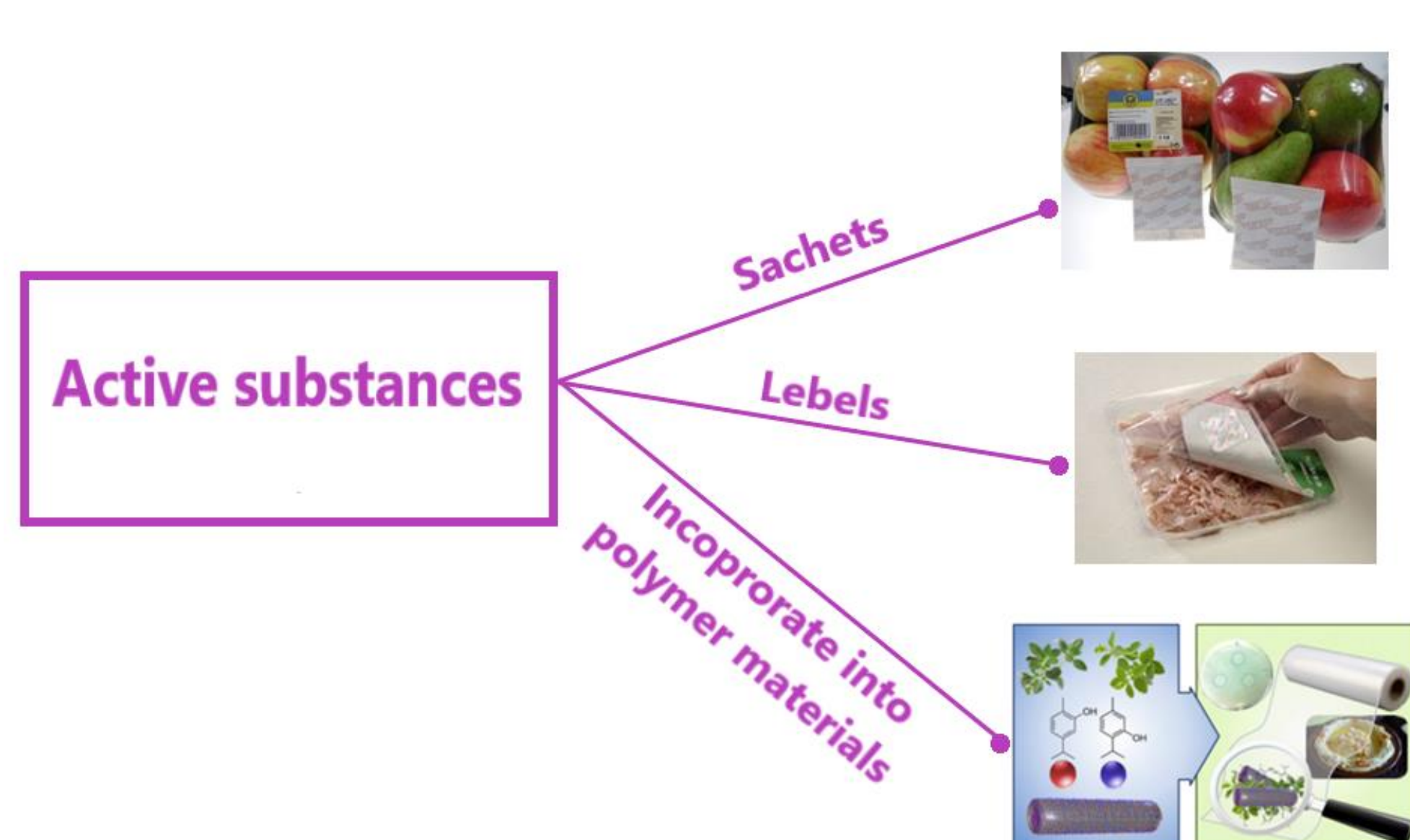


ACTIVE AND INTELLIGENT PACKAGING OF FOOD PRODUCTS

Tanja Petrović, Snežana Stevanović, Dragana Paunović, Jasmina Rajić, Biljana Rabrenović
University of Belgrade - Faculty of Agriculture, Institute of Food Technology and Biochemistry, 11080 Belgrade-Zemun,
Nemanjina 6, Serbia

ACTIVE PACKAGING

Active packaging is an innovative concept designed to incorporate appropriate active substances into a conventional packaging unit in various ways. The role of active substances is to react with certain components of the food or surrounding atmosphere (headspace), with the aim of extending the shelf life, while the initial quality of food remains unchanged. Active substances can be used as absorbers or emitters, and can be incorporated in packaged food in the form of sachets, labels or directly incorporated into packaging materials. Oxygen scavengers, ethylene, liquid and moisture absorbers, flavor and odor absorbers or emitters, antimicrobials, etc. are the most commonly used systems of active packaging.



The cross-section of the wall of active PET bottle with incorporated oxygen scavengers

INTELLIGENT PACKAGING

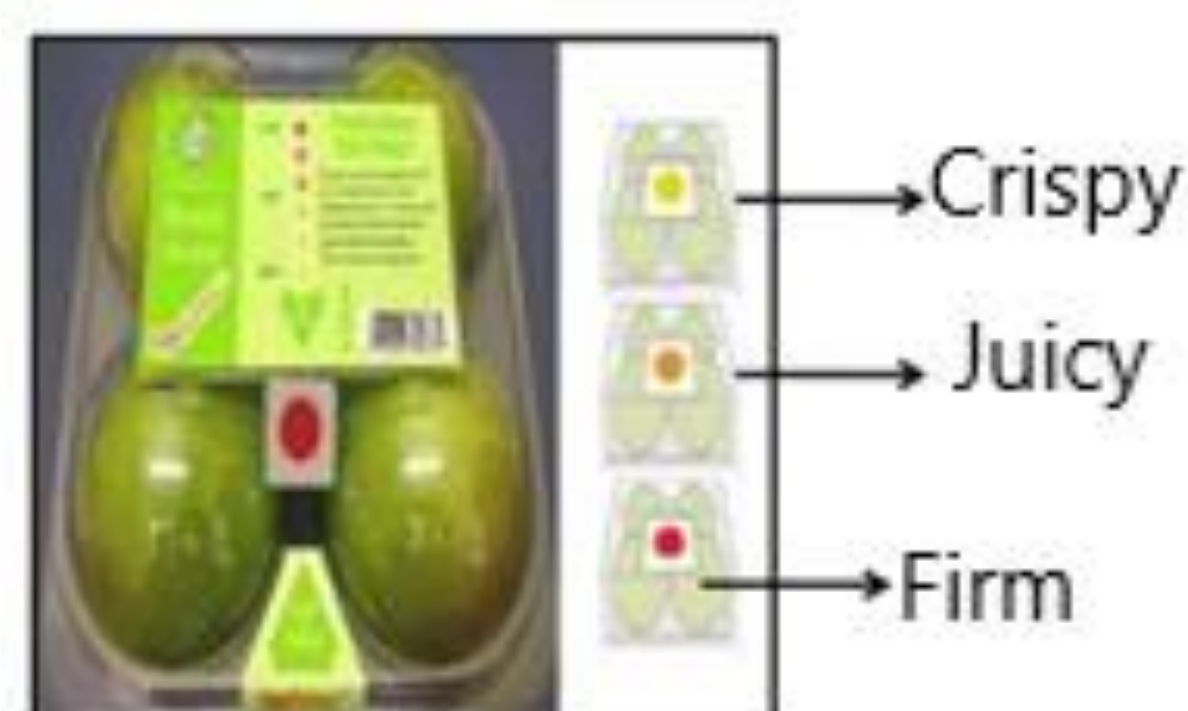
Intelligent packaging is created to monitor the condition of packaged food or the environment in order to provide information about its quality during transportation and storage. Intelligent packaging implies the use of different indicators, sensors and identification using RFID (Radio Frequency Identification Device - RFID) tags. The first task in designing an intelligent packaging system is to find a reliable interaction between the components of indicator and sensor with the packaged food product or headspace of packaging. They usually react with volatile compounds such as amines, ammonia, and ethanol and metabolites such as H₂S, CO₂, O₂, and ethylene that occur as a result of food decomposition and spoilage. These changes are most often reflected in the color change of intelligent systems, thus indicating, in real time, the quality and safety of packaged products. Intelligent packaging commonly includes time-temperature indicators, gas indicators, and freshness and ripening sensors. In addition, innovation and improvement of nanotechnology and nanomaterials will enable the development of better and new active and intelligent packaging.



Time temperature indicators



Indicators of freshness and seal and leak indicators



Sensors of fruit ripening



Intelligent packaging based on RFID technology

CONCLUSION

Application of active and intelligent packaging could contribute to prolong the shelf life of food products and real-time monitoring of food quality, which could significantly reduce the rejection of food products that still possess satisfactory quality. The development of new solutions in the field of food packaging will continue to be consumers oriented, and in the future it should expect greater use of active and intelligent packaging and greater concerns for the environmental aspect of food packaging.

References:

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