

Fundamentals and challenges in the encapsulation of organic photovoltaics.

Michiel Top (Fraunhofer FEP)

The flexible, lightweight and semi-transparent properties of organic photovoltaics make them attractive within various applications. However, one of the main challenges towards large area production is to provide the devices with a proper encapsulation against water vapor, oxygen, UV-light and mechanical impact. This presentation introduces the fundamentals within encapsulation of organic photovoltaics and gives an overview of recent work done at Fraunhofer FEP.

One of the most stringent requirements for the encapsulation remains the protection against water vapor and oxygen. This paper gives an overview of the different degradation mechanisms for organic electronics as a result of reaction with water vapor. Three different permeation pathways (schematically shown in Figure 1) are successfully identified and their contribution to the total degradation is explained.

The second part of this presentation presents recent work that is done at Fraunhofer FEP on the mechanical stability of barrier films. A fatigue test was designed to combine mechanical contact and load. Using this fatigue test, a barrier robustness can be defined. After definition of the barrier film robustness, several methods are reviewed to improve the mechanical performance of barrier films.

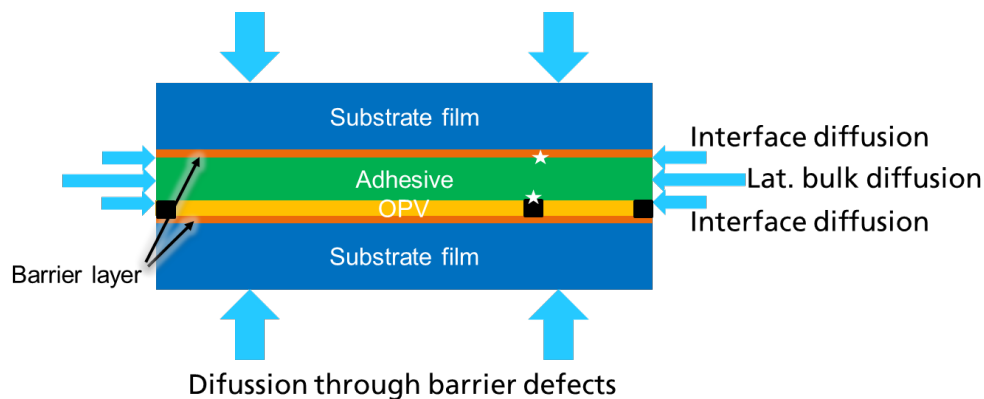


Figure 1. Several permeation pathways contribute to the total permeation of water vapor and oxygen.