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Functional Modelling of Water Vapour Transmission through Surface Defects Using Surface Segmentation Analysis

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Flexible Photovoltaic (PV) modules are manufactured using roll to roll (R2R) technology. These modules require a flexible barrier material to prevent water vapour ingress into the core material. Extensive research has been carried out on the WVTR of flexible barrier films, with different material systems and defects being examined. Significant research challenges remain, such as WVTR defects in the planarised Surface Segmentation Analysis. This is a critical factor for high performance PV modules with a 38 °C and 90% RH environment. The WVTR depends on various factors, such as barrier layer thickness and defect size. Mathematical models have been developed to predict WVTR, and these models should be refined to account for defects. The WVTR of different modules was measured in a controlled environment, and results were compared with theoretical predictions. The WVTR data and analysis methods should be further refined to improve the accuracy of WVTR predictions. The WVTR of different modules was measured in a controlled environment, and results were compared with theoretical predictions. The WVTR data and analysis methods should be further refined to improve the accuracy of WVTR predictions.