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Oxygen Barrier Coating with Carbon Interlayer on Polypropylene

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Gas barrier coating from dense thin film deposition has been one of the important applications such as food-packaging and organic display. Especially for food-packaging, plastic container has been widely used due to its low price and high through-put in mass production. However, the plastic container with low surface energy like polypropylene (PP) has been limited to apply gas barrier coating. That is because a gas barrier coating could not adhere to PP due to its too low surface energy and high porosity of PP. In this research, we applied carbon coating consisting of Si and O as an interlayer between silicon oxide (SiO_x) and PP. A carbon layer was found to provide better adhesion, which was experimentally proved by oxygen transmission rate (OTR) and SEM images. However, we also found that there is a limitation in the maximum thickness of a carbon layer and SiO_x film due to their high stress level. For this conflict, we obtain the optimal thickness of a carbon layer and SiO_x film showing optimal gas barrier property.

Keywords: oxygen-barrier, PP, thin film