RecyClass

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RECYCLASS TECHNICAL REVIEW

Brussels, 18 January 2024

The RecyClass PO Films Technical Committee (TC) investigated the impact of polyvinyl alcohol (PVOH) primer used with AlOx coating on recycling of PE films. This campaign was supported by BOBST, Bostik and Dow who participated in the production of the samples. With the result of this test campaign, the RecyClass PO Films Technical Committee managed to deliver the first recommendations on the compatibility of PVOH primer used with AlOx coating with PE flexible packaging recycling.

While it is commonly known that AlOx coating are fully compatible with PE film recycling[1], it is also frequent to have primer or topcoats used to ensure adhesion or protection of the AlOx layer. This layer, which often consists of PVOH, can also give barrier properties to the multilayer. For these reasons, RecyClass PO Films TC focused on evaluating two AlOx-treated films, with the following compositions:

1) MDO-PE / PVOH primer / AlOx, and

2) MDO-PE / PVOH primer / AlOx / Laminating adhesive / LDPE (see Annex I).

In each film, the PVOH primer was applied with a coating weight of 1 gsm, which represented respectively about 4.5 wt% and 2.0 wt% of the total weight of the film. Note that the laminating adhesive used in the films was previously approved by RecyClass as fully compatible with PE film recycling[2]. Tests were conducted at Proplast according to RecyClass Recyclability Evaluation Protocol for PE Films, with a film made from LDPE 310E as control material.

Results showed a high coloration of the pellets due to presence of the primer (see Annex II). The extrusion process was also affected by the presence of the innovation, with a clear pressure increase along the run, and the observation of white fumes, in addition to black specks present in the pellets. These pellets could still be used to produce blown film, but volatiles and odours could be observed for the sample with the highest concentration of PVOH. The films were suffering from many defects such as rough surfaces, high increase of gels, presence of black particles, or strong decrease of dart impact resistance, which could be attributed to degradation of the PVOH during the different processes or its interaction with the laminating adhesive.

[1] Design for Recycling Guidelines for PE films

[2] Approval Letter of Bostik SF10M available here

Overall, the outcome of this test campaign was that PVOH primers could significantly affect the quality of the recyclate or the stability of the recycling process.

As a summary and according to the results that were obtained from the Recyclability Evaluation Protocol, the RecyClass PO Films Technical Committee defined the compatibility of the PVOH primer for AlOx coating with the PE recycling stream as low compatible with both PE and PP film recycling.

The PO Films Technical Committee would like also to emphasize that this recommendations on PVOH primer can be challenged through Recyclability Approval process, for future innovations, to obtain product specific Approval Letters. Besides, other primer chemistries er could be leading to better performances.

About RecyClass

RecyClass is a non-profit, cross-industry initiative advancing recyclability, bringing transparency to the origin of plastic waste and establishing a harmonized approach toward recycled plastic calculation & traceability in Europe. RecyClass develops Recyclability Evaluation Protocols and scientific testing methods for innovative plastic packaging materials which serve as the base for the Design for Recycling Guidelines and the RecyClass Online Tool. RecyClass established Recyclability Certifications for plastic packaging, Recycling Process Certification and Recycled Plastics Traceability Certification for plastic products.

RecyClass – Plastic Future is Circular

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Annex I

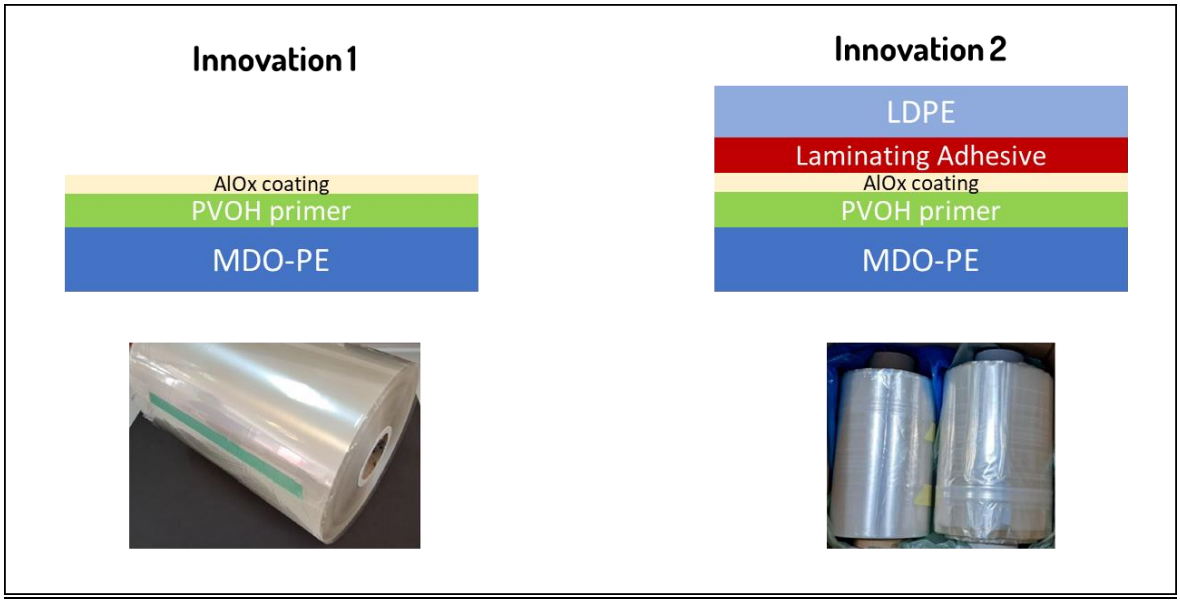

Figure 1: Composition of samples used for the test campaign.

Annex II

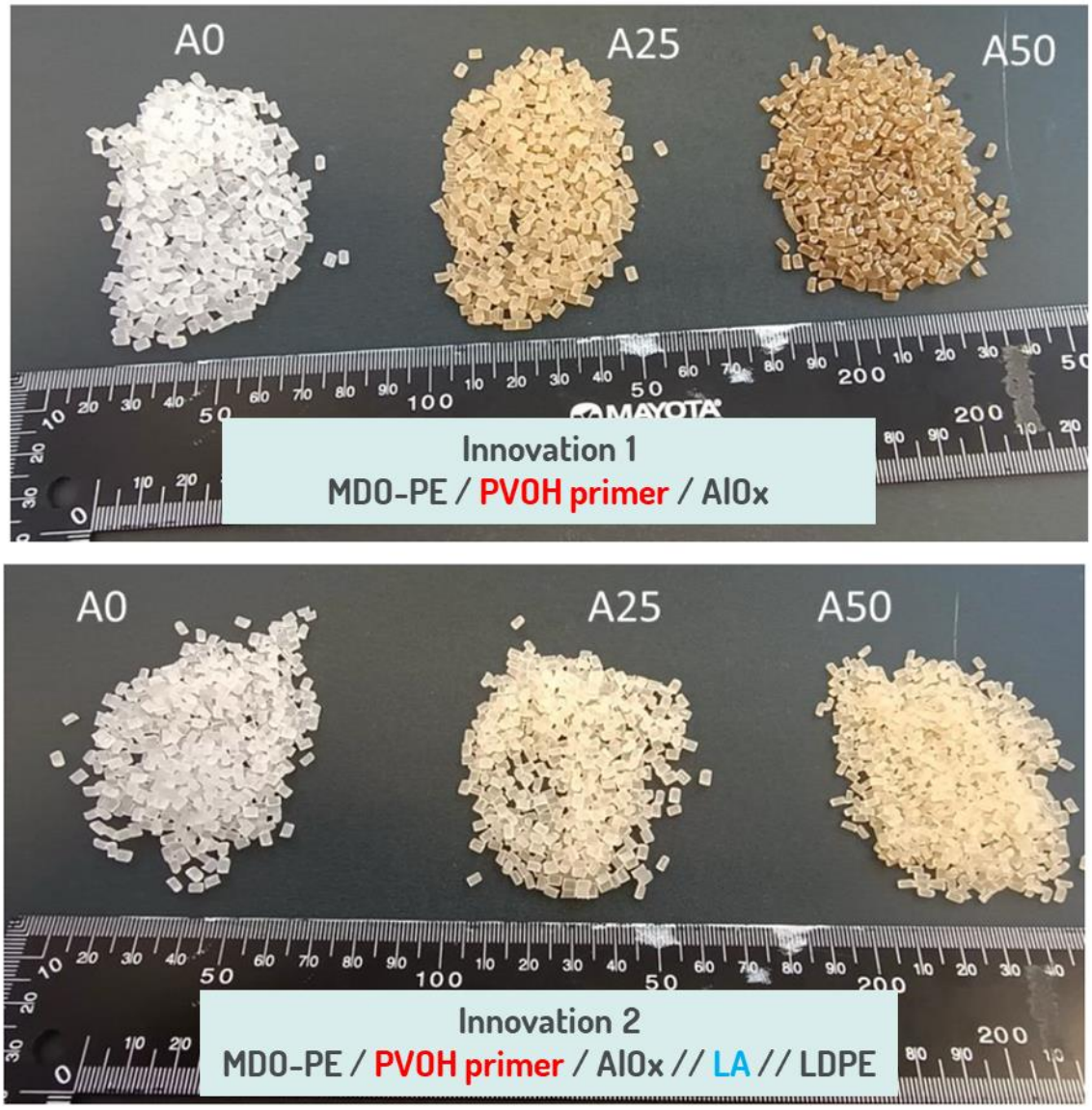

Figure 2: Coloration of A.0, A.25 and A.50 blends after extrusion, due to the presence of PVOH primer