

# Plasma assisted deposition of AlO<sub>x</sub> barrier coatings for packaging applications

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In recent years, transparent barrier coatings such as aluminium oxide (AlO<sub>x</sub>) or silicon oxide (SiO<sub>x</sub>) have been gaining interest over opaque metallized films in that they offer product visibility, microwaveability/retortability, compatibility with metal detector and recyclability, whilst still providing the barrier level required [1]. The use of vacuum deposition techniques to produce transparent barriers has become very attractive, ensuring similar barrier properties with three order of magnitude thinner layers.

In this contribution, we illustrate our AlO<sub>x</sub> platform, which has been obtained modifying a standard 'boat type' roll-to-roll metallizer to deposit transparent barrier coatings. The process consists of three subsequent steps: (i) pre-treatment; (ii) AlO<sub>x</sub> deposition; (iii) post-treatment. In the pre-treatment a plasma is used to prepare the surface to be coated removing particles that can affect barrier and to increase the surface tension. During the deposition, aluminium is evaporated under high vacuum using heated boats. In its free path, aluminium vapour is exposed to an oxygen flow that oxidized it before it is deposited on the running web. Multiple plasma guns could be used to oxidize and energize aluminium clouds. Finally, a post-deposition plasma could be used to further oxidize the AlO<sub>x</sub> layer.

A complete chemical, morphological and mechanical characterization of the AlO<sub>x</sub> barrier coatings produced onto polyethylene terephthalate (PET) and biaxially oriented polypropylene (BOPP) will be reported and discussed in relation to their barrier properties.

[1] C. F. Struller, P.J. Kelly, N.J. Copeland, *Surface & Coatings Technology* 241 (2014) 130-137.

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