

#### **OT4 Characterization of Oxidative Changes in HALS in Coil Coatings by Mass Spectrometry**

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New methods, including desorption electrospray ionisation, have characterised structural changes on anti-oxidant additives in polymer coatings.

Polymer-based surface coatings are of considerable importance in many everyday applications. Thermosetting, polyester-based coatings are of particular interest to BlueScope Steel: these systems form the basis for pre-painted steel products employed in many building applications. Darker products in the colour palette, when employed in roofing applications, can reach temperatures over 90°C under typical in-service conditions through absorption of the infrared component of sunlight. This makes them particularly susceptible to thermo-photo-oxidative degradation processes which ultimately govern product lifetime [1]. Hindered amine light stabilisers (HALS) are a class of commercial additives routinely added to surface coatings to retard this degradation, acting as chain-breaking anti-oxidants. This improves the retention of aesthetic properties of the coating and increases service lifetime [1, 2]. In order to participate in these free radical mediated degradation reactions, the parent HALS compounds undergo an activation step to a nitroxyl radical intermediate [2]. In this study, electrospray ionisation- and desorption electrospray ionisation-mass spectrometry have been employed for the characterisation of oxidative changes in HALS that may be associated with its anti-oxidant action as well as possible structural modifications that render the HALS ineffective. By characterising the activation and degradation of commercial HALS, the design of novel HALS compounds specifically for the coil coating systems of BlueScope Steel will be facilitated - most current commercial additives being optimised for automotive applications.

[1] J. Pospisil, S. Nespurek. *Prog. Polym. Sci.* 2000, 25: 1261-1335.

[2] E.T Denisov. *Polym. Degrad. Stab.* 1991, 34: 325.