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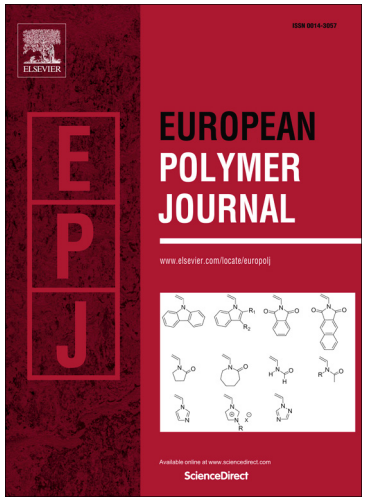

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PII: S0014-3057(16)30862-X
DOI: http://dx.doi.org/10.1016/j.eurpolymj.2016.09.020
Reference: EPJ 7491

To appear in: *European Polymer Journal*

Received Date: 4 August 2016
Revised Date: 7 September 2016
Accepted Date: 11 September 2016

Please cite this article as: Windrich, F., Kappert, E.J., Malanin, M., Eichhorn, K-J., Häußler, L., Benes, N.E., Voit, B., In-situ imidization analysis in microscale thin films of an ester-type photosensitive polyimide for microelectronic packaging applications, *European Polymer Journal* (2016), doi: http://dx.doi.org/10.1016/j.eurpolymj.2016.09.020

In-situ imidization analysis in microscale thin films of an ester-type photosensitive polyimide for microelectronic packaging applications

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ABSTRACT

The imidization reaction in thin films of an ester-type photosensitive polyimide is investigated in the temperature range of 50 – 450°C by temperature dependent rapid-scan in-situ FT-IR spectroscopy, thermo-ellipsometric analysis and thermogravimetric analysis coupled with evolved gas analysis. The influence of the UV crosslinkable methacrylic functional group in the polymer sidechain on the imidization reaction is studied. For non-crosslinked precursor films the imidization is completed at ≈250°C. Depending on the amount of crosslinking the temperature to achieve full imidization is shifted to higher values. Above a certain amount of crosslinking the degree of imidization is limited to ≈95% for temperatures below 280°C. The reaction continues by further increase of the temperature to >340°C. Evolved gas analyses indicate that the cleave-out of crosslinker is required to finish the imidization. The film shrinkage and weight loss is correlated to the degree of imidization.

KEYWORDS: photosensitive polyimide; in-situ ellipsometry; thermal imidization; low-temperature cure