

## Accepted Manuscript

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PII: S1385-8947(18)30671-5  
DOI: <https://doi.org/10.1016/j.cej.2018.04.097>  
Reference: CEJ 18897

To appear in: *Chemical Engineering Journal*

Received Date: 3 February 2018  
Revised Date: 2 April 2018  
Accepted Date: 15 April 2018

Please cite this article as: Y-J. Xu, L. Chen, W-H. Rao, M. Qi, D-M. Guo, W. Liao, Y-Z. Wang, Latent Curing Epoxy System with Excellent Thermal Stability, Flame Retardance and Dielectric Property, *Chemical Engineering Journal* (2018), doi: <https://doi.org/10.1016/j.cej.2018.04.097>

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# Latent Curing Epoxy System with Excellent Thermal Stability, Flame Retardance and Dielectric Property

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## Abstract

To obtain a latent curing epoxy system with satisfactory thermal stability, flame retardance and dielectric properties, imidazolium dibenzo[c,e][1,2]oxaphosphate (IDOP) was synthesized by a facile way and utilized as a latent flame-retardant curing agent for epoxy resins (EP). It was confirmed that IDOP/EP one-pack system kept reactive inert near room temperature and cured efficiently under heating with a moderate heat release. The curing procedure was explored by X-ray photoelectron spectroscopy (XPS), confirming that the flame-retardant group was incorporated into epoxy chains by covalent and/or ionic bonds, hence the intrinsic flame retardance and excellent thermal stability were given to the cured resins finally. With only 15 wt% IDOP additions, the limiting oxygen index (LOI) increased to 37.0% from 20.5% of the reference sample, and UL-94 V-0 rating was achieved. The results of cone calorimetry test further certified that IDOP/EP showed satisfactory flame retardance dominating in gaseous phase, which was confirmed by the results of thermogravimetric analysis/infrared spectrometry (TG-IR). The thermal mechanical behavior of IDOP/EP was also evaluated by dynamic mechanical analysis (DMA). Especially, the incorporation of the flame-retardant group didn't deteriorate the dielectric properties of the cured resin.

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