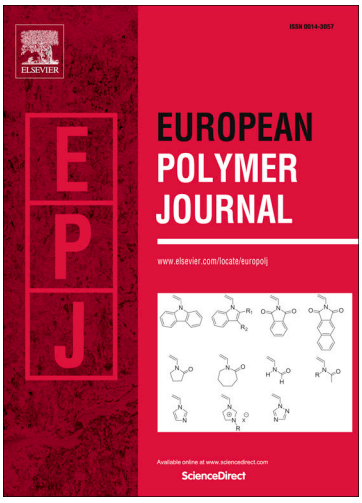

Benzocyclobutene organosiloxane resins prepared by alcoholysis of BCB functionalized chlorosilane for highly crosslinked low-k thermosets

Yuanrong Cheng, Shichang Tian, Yunfei Shi, Wenhao Chen, Zhuo Li, Tangwei Zhu, Ziyu Zhang

PII: S0014-3057(17)30882-0
DOI: http://dx.doi.org/10.1016/j.eurpolymj.2017.08.034
Reference: EPJ 8027

To appear in: *European Polymer Journal*

Received Date: 25 May 2017
Revised Date: 8 August 2017
Accepted Date: 15 August 2017

Please cite this article as: Cheng, Y., Tian, S., Shi, Y., Chen, W., Li, Z., Zhu, T., Zhang, Z., Benzocyclobutene organosiloxane resins prepared by alcoholysis of BCB functionalized chlorosilane for highly crosslinked low-k thermosets, *European Polymer Journal* (2017), doi: http://dx.doi.org/10.1016/j.eurpolymj.2017.08.034

Benzocyclobutene organosiloxane resins prepared by alcoholysis of BCB functionalized chlorosilane for highly crosslinked low-k thermosets

Yuanrong Cheng*, Shichang Tian, Yunfei Shi, Wenhao Chen, Zhuo li, Tangwei Zhu, Ziyu Zhang

[1]*Department of Materials Science, Fudan University, 220 Handan Road, Shanghai 200433, People's Republic of China. Email: chengyr@fudan.edu.cn*

In this paper, highly crosslinked benzocyclobutene (BCB) organosiloxane intrinsic low-k thermosets with high thermal stability were prepared by thermal-curing of BCB organosiloxane resins, which were synthesized by alcoholysis of BCB functionalized chlorosilane (BCS) with silanol. Firstly, BCS was prepared by dichloromethylvinylsilane with 4Br-BCB by Grignard reaction. 1,4-Phenylenebis(dimethylsilanol), [1,1'-biphenyl]-4,4'-diylbis(dimethylsilanol) and diphenylsilanediol as silanol precursors were reacted with BCS to prepare BCB organosiloxane resins. These resins could be cured above 200 ^{o}C to prepare highly cross-linked thermosets with high thermal stability with T_{d5} above 450 ^{o}C. DMA studies showed that these thermosets show high Tg above 250 ^{o}C. The cured resins showed relative low dielectric constant and dissipation loss. Typically, the resin with silbiphenylene structure showed a dielectric constant of 2.69. Meanwhile, the relationship of chemical structure and properties of the cured resins were discussed, especially in the dynamic mechanical analysis and dielectric properties. These cured resins with good dielectric properties and high thermal stability can be a promising candidate for interlayer dielectric materials in semiconductor packaging.

Keywords: benzocyclobutene; organosiloxane; alcoholysis; thermal stability; low-*k*