

## *Supplementary Information to Article*

# **Soluble fluorinated cardo copolyimide as an effective additive to photopolymerizable compositions based on di(meth)acrylates: application for highly thermostable primary protective coating of silica optical fiber**

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### TMA and TGA results

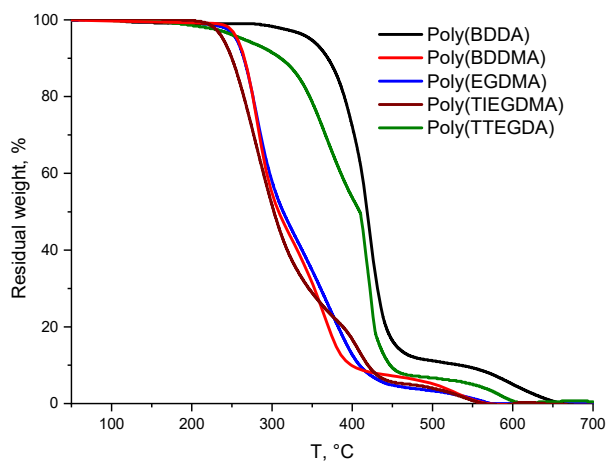
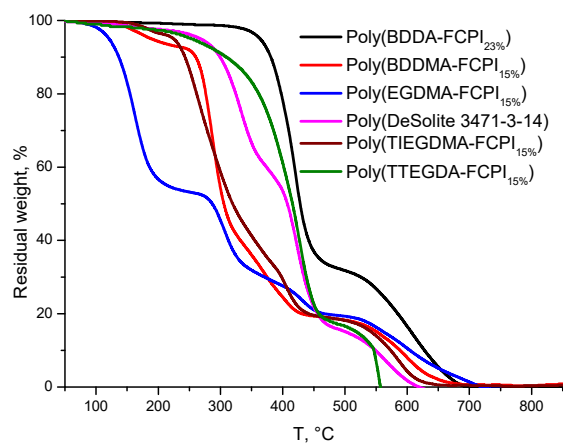
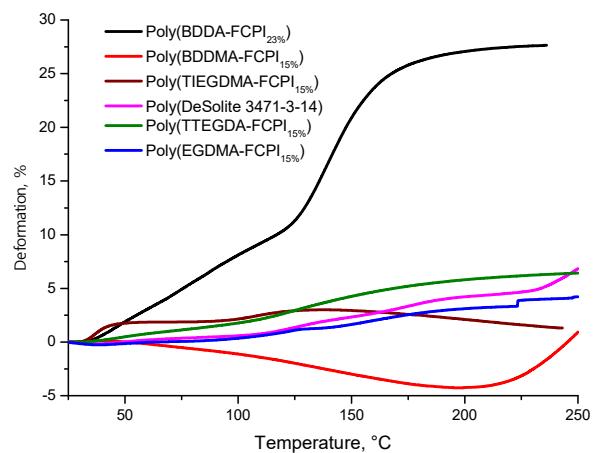
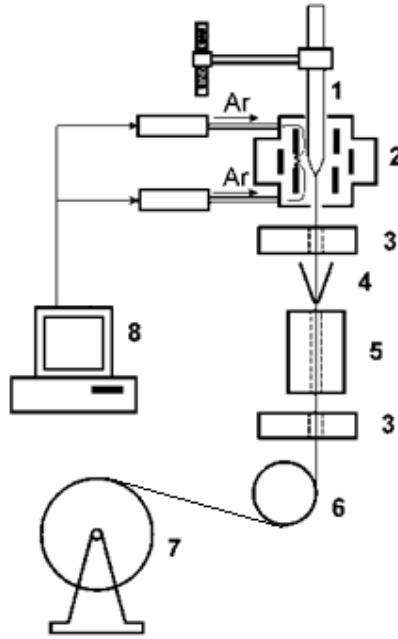


Figure S1. TMA and TGA results of polymers.

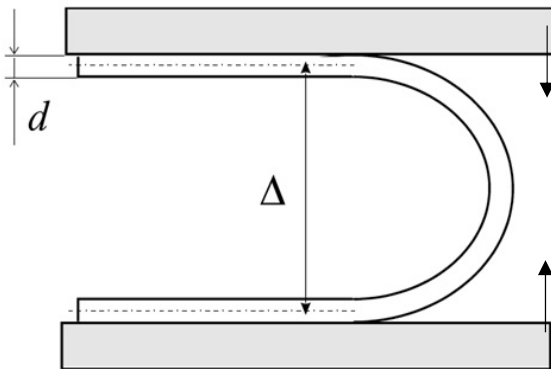
Fiber drawing scheme, two-point bend failure strain measurement and calculation



**Figure S2.** A general scheme of fiber drawing involving a conventional coating process (1 – silica preform, 2 – furnace, 3 – laser measuring system of diameter, 4 – die, 5 – UV block, 6 – pulling roller, 7 – reel, 8 – control system).

In a two-point bending test (Figure S3) [1], a section of glass fiber, diameter  $d$  ( $\mu\text{m}$ ), is bent into a U-shape between two parallel faceplates, one of which travels towards the second at a constant faceplate velocity ( $v_{fp}$ ), compressing the 'U' until failure. The distance between the axes of non-curved sections of the fibers at failure ( $\Delta$ ,  $\mu\text{m}$ ) is recorded, and the maximum elongation ( $\epsilon_{max}$ ) is then calculated from:

$$\epsilon_{max} = 1.219 * \frac{d}{\Delta_1} - 1.137 * \left(\frac{d}{\Delta_1}\right)^2$$



**Figure S3.** Schematic diagram of a two-point bend test.

Thus, it is possible to calculate the failure strain:

$$\sigma_{max} = \varepsilon_{max}E,$$

where E is the Young's modulus of quartz glass. Given that the Young's modulus depends on the relative elongation, we obtain the final expression for failure strain:

$$\sigma = \varepsilon E_0 \left(1 + \frac{\alpha \varepsilon}{2}\right),$$

where  $E_0 = 74$  GPa,  $\alpha = 6.9$ .

Experimental results are presented in the form of Weibull plots [2].

## References

1. Z. Tang, Two-point bend studies of glass fibers, Missouri University of Science and Technology, 2011.  
<https://core.ac.uk/download/pdf/229270761.pdf>
2. NIST/SEMATECH e-Handbook of Statistical Methods.  
<https://www.itl.nist.gov/div898/handbook/eda/section3/eda33u.htm>