

## Supporting information

### **Synthesis of Microcrosslinked Adamantane-Containing Matrix Resins Designed for Deep-UV Lithography Resists and Its Application in Nanoimprint Lithography**

*Nan-Jun Wei<sup>1</sup>, Yang Liu<sup>1</sup>, Jing Zhao<sup>2</sup>, Ya-Juan Cai<sup>3</sup>, Xu Yang<sup>2</sup>, Chuan-Zhe Zhao<sup>1</sup>, Yi-Bo Li<sup>1</sup>, Ke-Xiao Sang<sup>1</sup>, Yi-Xing Sun<sup>1</sup>, Zi-Hao Yang<sup>1</sup>, Ya-Ge Wu<sup>1</sup>, Jing-Gang Gai<sup>1,\*</sup>*

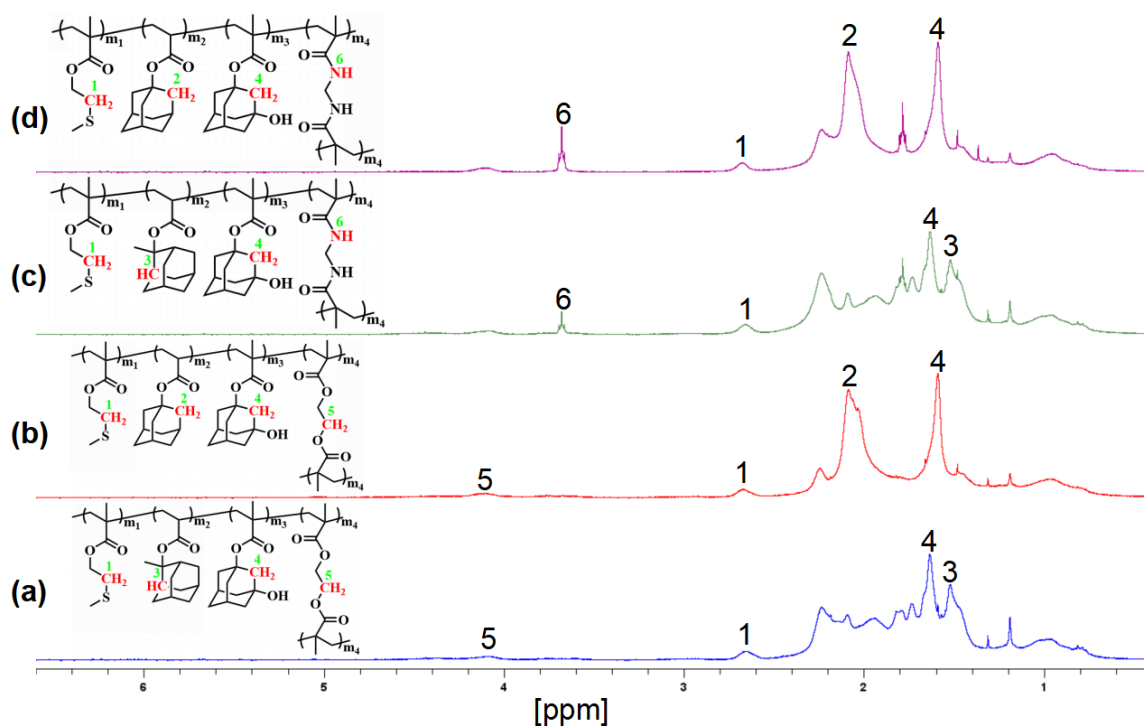
<sup>1</sup>State Key Laboratory of Polymer Materials Engineering, Polymer Research Institute of Sichuan University, Chengdu, Sichuan 610065, China

<sup>2</sup>PetroChina Liaoyang Petrochemical Company, No. 7 Torch Street, Hongwei District, Liaoyang, Liaoning 111000, China

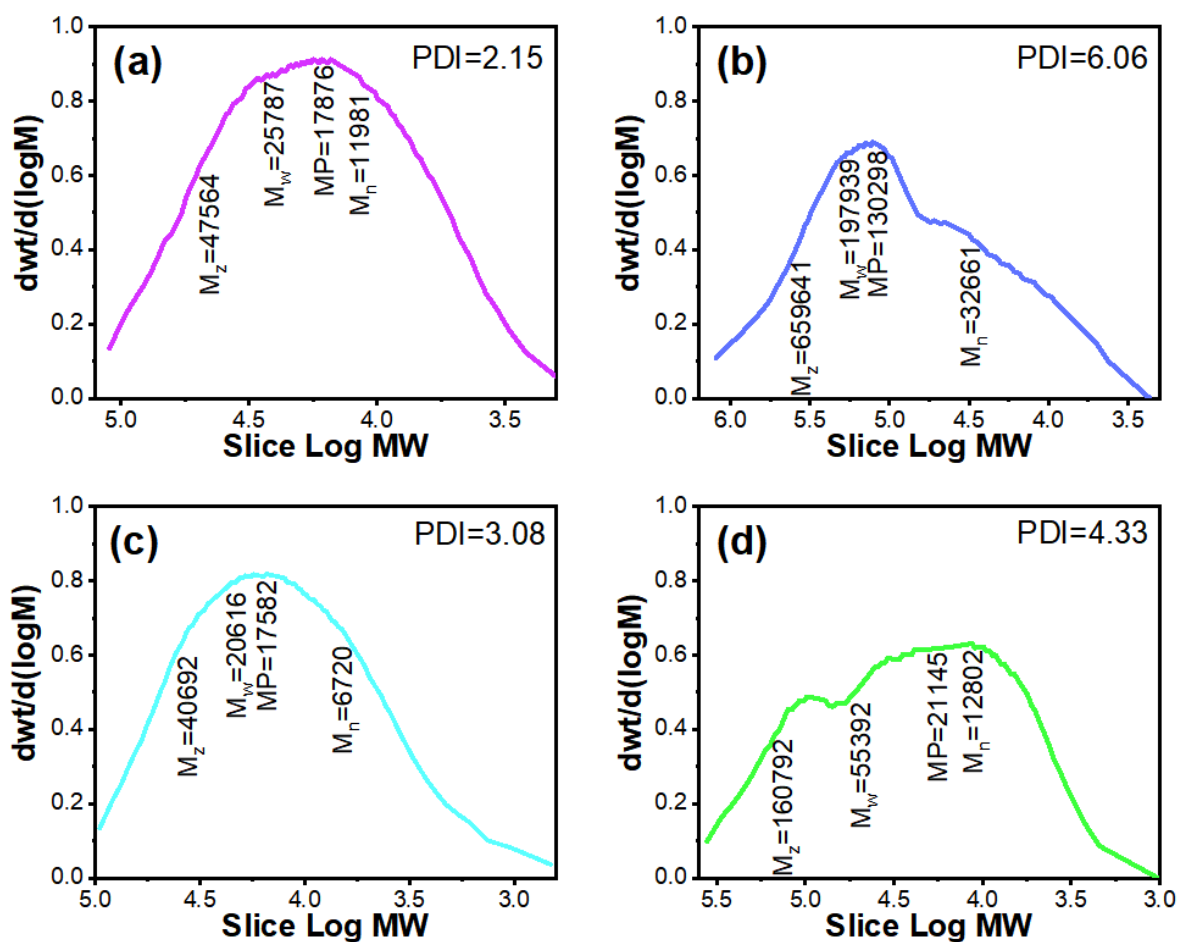
<sup>3</sup>Sichuan Guojian Inspection Co., Ltd, No. 17, Section 1, Kangcheng Road, Jiangyang District, Luzhou 646099, Sichuan, China

Corresponding author: [gaijinggang@scu.edu.cn](mailto:gaijinggang@scu.edu.cn) (J-G. Gai)

1-H NMR spectra were shown in Figure S1. The chemical shift of H of CH<sub>2</sub> connected to the sulfur appeared at 2.66 ppm (signal 1), proving that MTEMA successfully was incorporated into all polymer molecules. The chemical shift of the H of CH<sub>2</sub> between the two quaternary carbon atoms on the hydroxyadamantal group was 1.6 ppm (signal 4), indicating HMAOOA was successfully introduced into all polymer chains. The chemical shift of the H of ethyl in crosslinked monomer EDMA was 4.09 ppm (signal 5), and the chemical shift of the H of imino on the other crosslinked monomer MBAA was 3.68 ppm (signal 6). 1.52ppm (signal 3) was the chemical shift of the H of isomethylene on methyl adamantane, proving the structure of PMMHE together with signal 1, signal 4 and signal 5, and determining the structure of PMAHE together with signal 1, signal 4 and signal 6. And 2.08 (signal 2) was the chemical shift of the H of methylene on adamantane, indicating the structure of PMMHEM together with signal 1, signal 4 and signal 5, and demonstrating the structure of PMAHM together with signal 1, signal 4 and signal 6.



**Figure S1.** 1-H NMR spectra of (a) PMMHE, (b) PMAHE, (c) PMMHEM and (d) PMAHM.



**Figure S2.** Molecular weight and polydispersity index of (a) PMMHE, (b) PMAHE, (c) PMMHM and (d) PMAHM.