

## Supporting material

**Statement of theoretical highest average molecular weight of PPTA.** H<sub>2</sub>O content in NMP was tested by a moisture-testing instrument (Mettler Toledo, Switzerland) and the result was 49.1 ± 9.7 ppm. When the concentration of TPC solution was 0.2 mol/L, about 0.7 % TPC would be hydrolyzed by H<sub>2</sub>O contained in the solution assuming all H<sub>2</sub>O would react with TPC and deactivate them. According

the formula of degree of polymerization  $\bar{X}_n = \frac{1+r}{1+r-2rP}$ , the highest average molecular weight of PPTA was obtained when the functional groups conversion ( $P$ ) was exactly 1. When ideal feedstock (molar ratio of TPC/PPD = 1:1) was chosen, the practical molar ratio was 0.993, and highest degree of polymerization was 284.7. Correspondingly, the highest number-average molecular weight was 6.8\*10<sup>4</sup> and the highest weight-average molecular weight was 1.0\*10<sup>5</sup> because the PDI was about 1.5.