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## APPENDICES

**APPENDIX A**  
**THERMOGRAVIMETRIC ANALYSIS (TGA)**  
**CHARACTERIZATION**

A-1 TGA diagrams of polyimide and hyperbranch polyimide

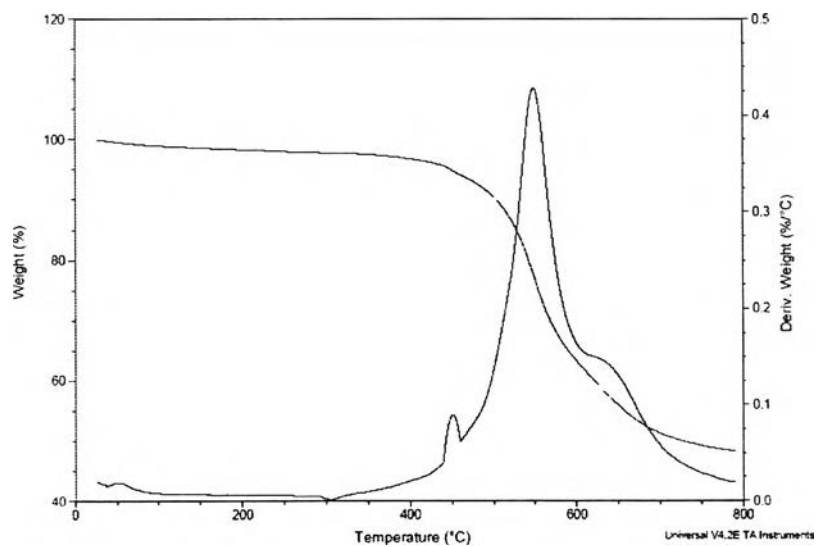


Figure A-1 Thermogravimetric analysis of polyimide at rate 10°C/min, in N<sub>2</sub>

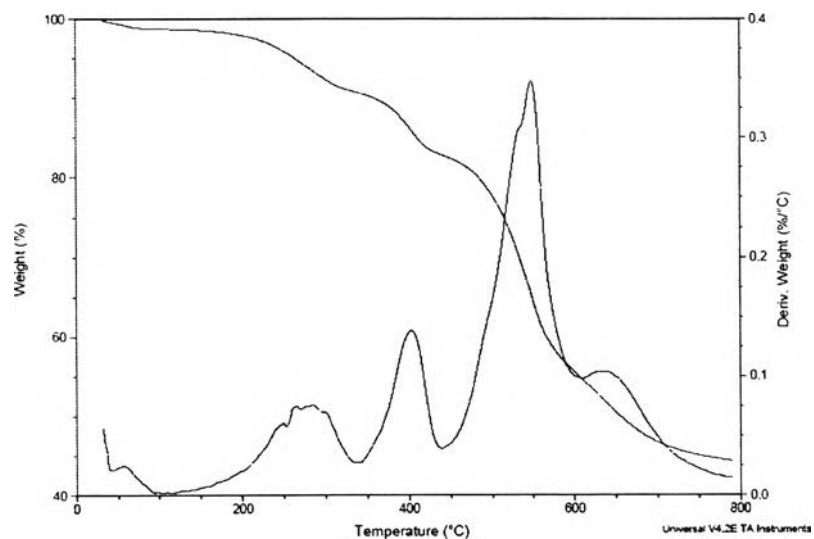
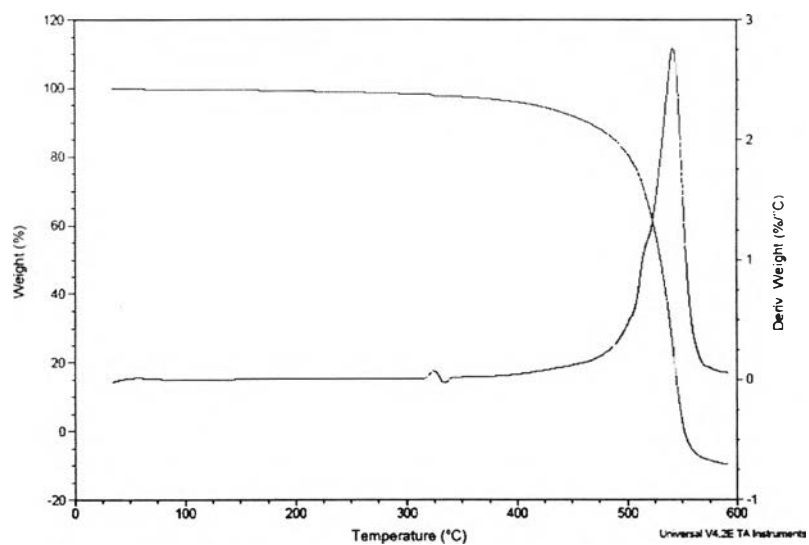
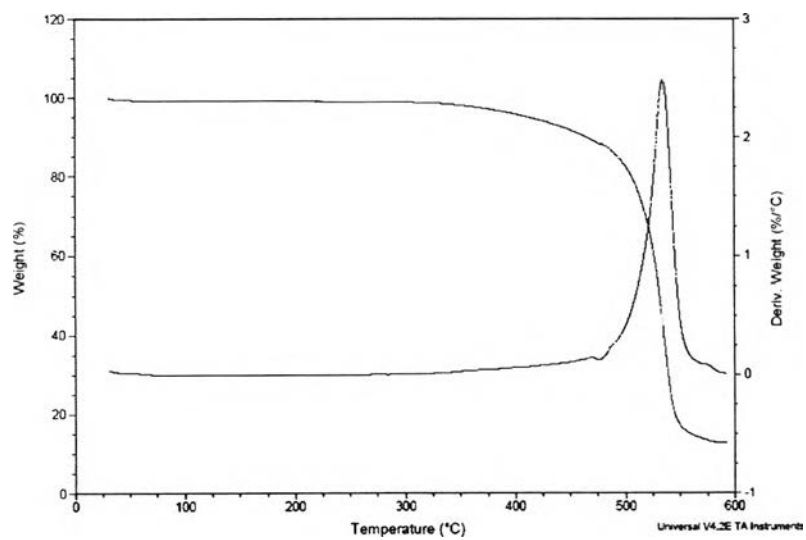


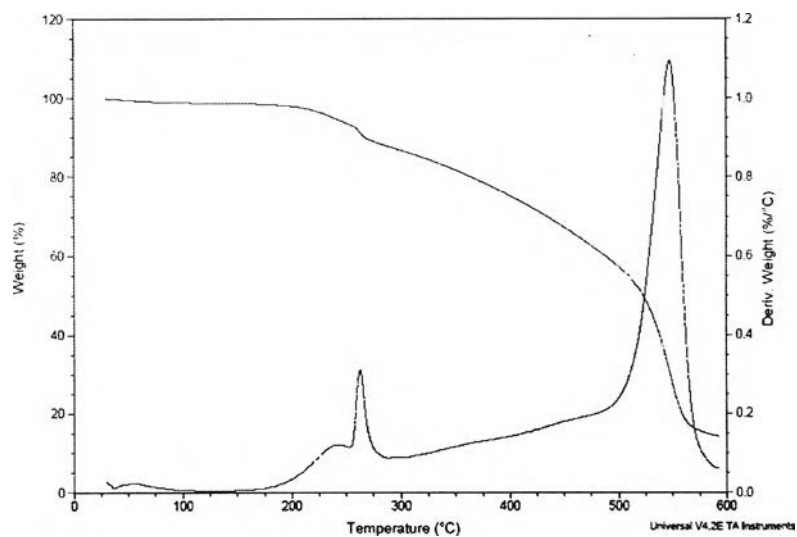
Figure A-2 Thermogravimetric analysis of hyperbranch polyimide (PI-L3) at rate 10°C/min, in N<sub>2</sub>



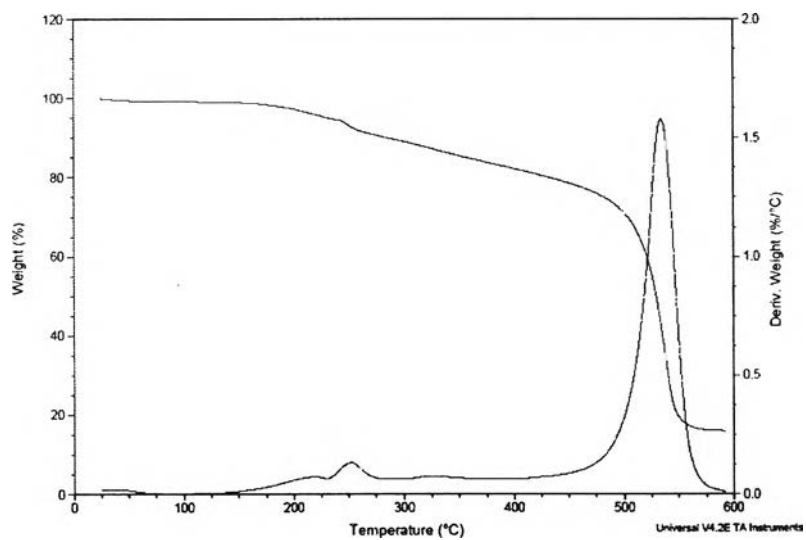
**Figure A-3** Thermogravimetric analysis of polyimide at rate 10°C/min, in O<sub>2</sub>



**Figure A-4** Thermogravimetric analysis of POSS-polyimide at rate 10°C/min, in O<sub>2</sub>



**Figure A-5** Thermogravimetric analysis of hyperbranch polyimide (PI-L2) at rate  $10^{\circ}\text{C}/\text{min}$ , in  $\text{O}_2$



**Figure A-6** Thermogravimetric analysis of hyperbranch polyimide (PI-L3) at rate  $10^{\circ}\text{C}/\text{min}$ , in  $\text{O}_2$

# APPENDIX B

## DYNAMIC MECHANICAL ANALYSIS (DMA)

### CHARACTERIZATION

#### B-1 DMA diagrams of Polyimide

These DMA diagrams showed  $E'$ ,  $E''$ , and  $\tan\delta$  at various frequencies of each sample.

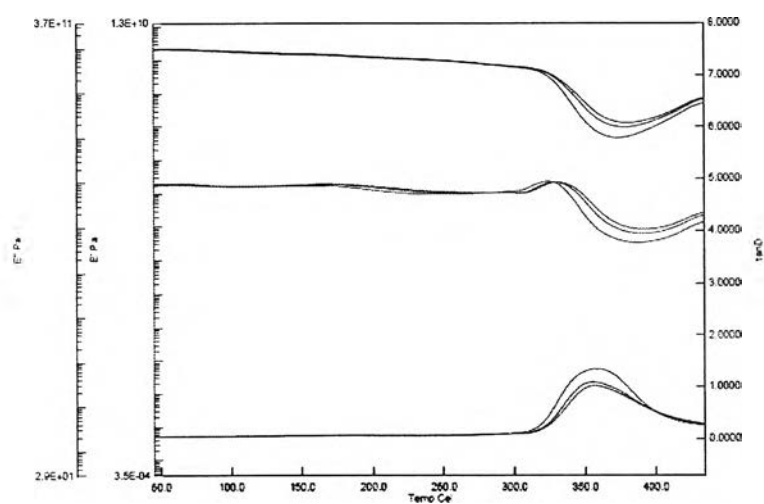


Figure B-1 DMA diagram of pure polyimide

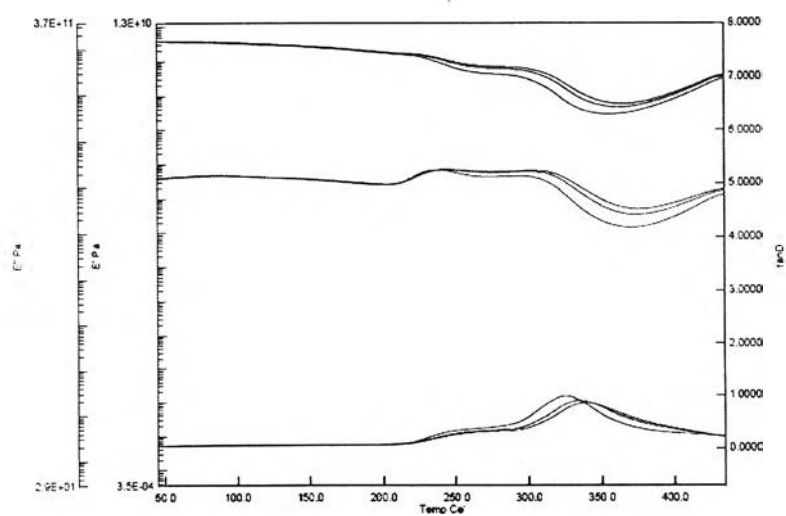


Figure B-2 DMA diagram of hyperbranch polyimide (L3)



## VITA

Miss Bongkoch Somboonsub was born on June 20, 1983 in Prachinburi, Thailand. She received the Bachelor's Degree in Chemical Engineering from Department of Chemical Engineering, Faculty of Engineering, Srinakharinwirot University in March 2005, She entered the Master of Engineering in Chemical Engineering at Chulalongkorn University in June, 2005.

