

# Polyimides with good solubility and high Tg

Shinsuke Inoue

MANAC Inc., Research Laboratory

92 Minooki-cho, Fukuyama, Hiroshima 721-0956 JAPAN

E-mail: [s.inoue@manac-inc.co.jp](mailto:s.inoue@manac-inc.co.jp)

## Abstract

Good organosoluble polyimides which have high glass transition temperature (Tg) were prepared in our laboratory. These polyimides are now under development for processing and quality. And they will be released in the near future in order to apply in the new polyimide market.

The developed polyimides are consisted with our special anhydride and aromatic diamine. The typical polyimides are soluble to N,N-Dimethylformamide(DMF), N,N-Dimethylacetamide(DMAc), 1-Methyl-2-pyrrolidone (NMP), 1,3-Dioxolane and Tg, Td(5wt%loss) and CTE are as follows,

Tg : 257.1°C(DSC), Td(5wt%loss) : 563.1°C

CTE : 36ppm (50-200°C)

## Thermal analysis

For the first step, the thermal analysis of the typical polyimide was done. DTA-TGA chart are shown below. DSC and TMA are illustrated in the next page.

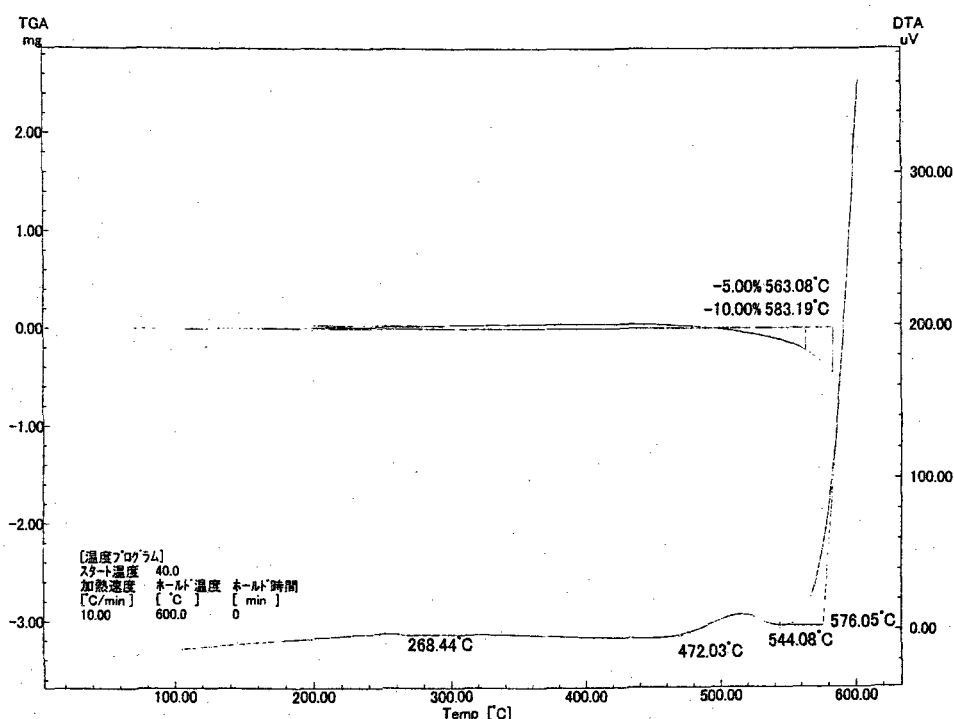


Fig 1 DTA-TGA measurement (air atmosphere) of typical PI film

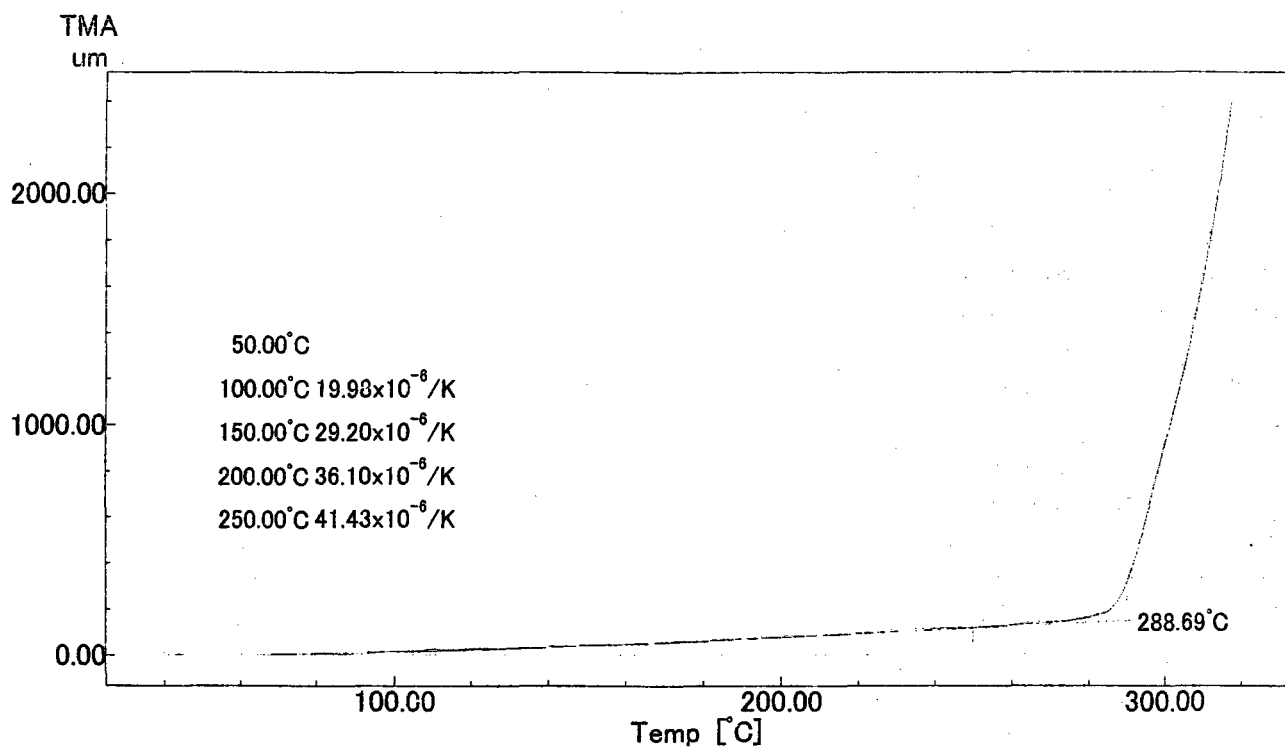


Fig 2-1 TMA measurement of typical PI film (thickness 21  $\mu$ )

CTE was calculated from 50°C every 50°C  
(Start temp.: 40°C heat rate : 5°C/min Initial load : 4.0g)

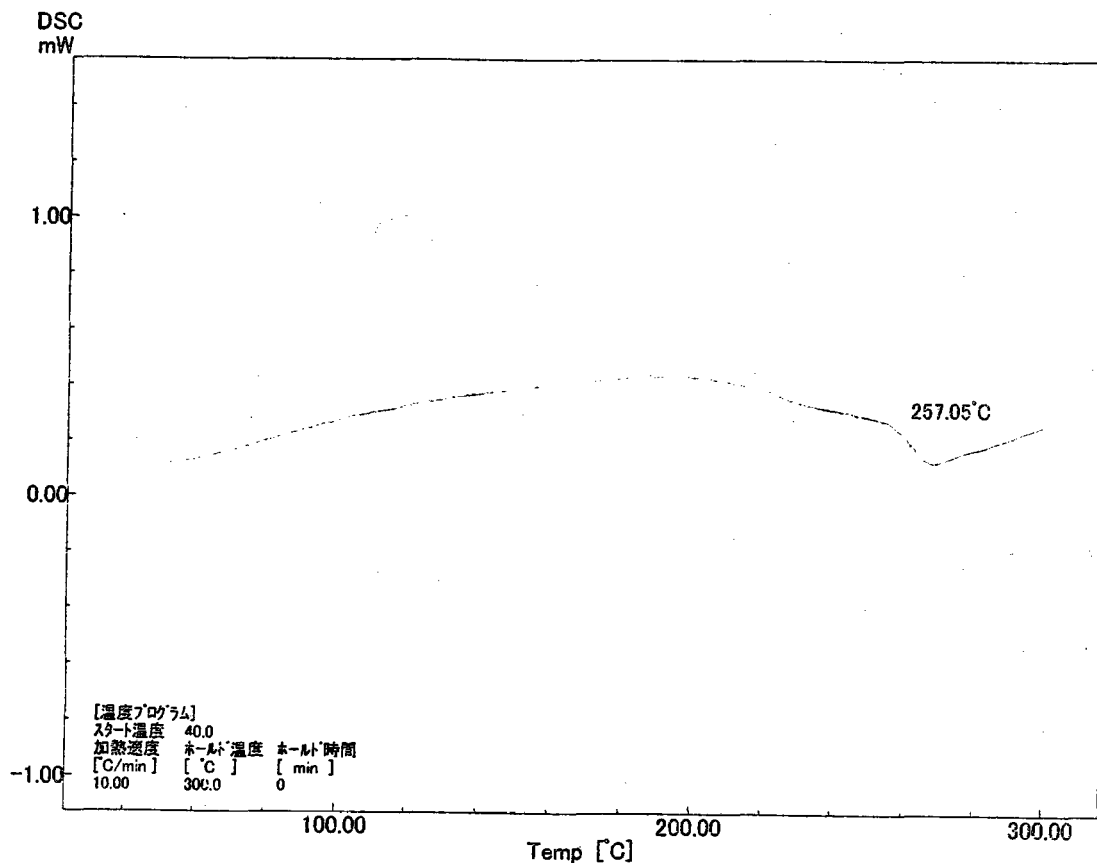


Fig 2-2 DSC measurement of typical PI film

In the DTA-TGA measurement (Fig 1) the polyimide film did not have the fusion appearance. Usually organosoluble polyimide shows the thermo plasticity in the thermal analysis. But our developed organosoluble polyimide did not show the melting point. This means that our organosoluble polyimide has an amorphous structure. From Td(5wt%loss) of Fig 1, good thermal stability of the polyimide was also observed.

To make more characterization of the polyimide above, more data is necessary. Especially mechanical and rheological properties should be examined in detail. Polyimide vanish containing mechanically tough polyimides is our goal to be obtained. This means that its polyimides have high molecular weight. The relationship between organosolubility and molecular weight is in inverse proportion. But if transformation of our polyimides from vanish to film or solid state has happened, mechanically tough polyimides with good solubility might be prepared.