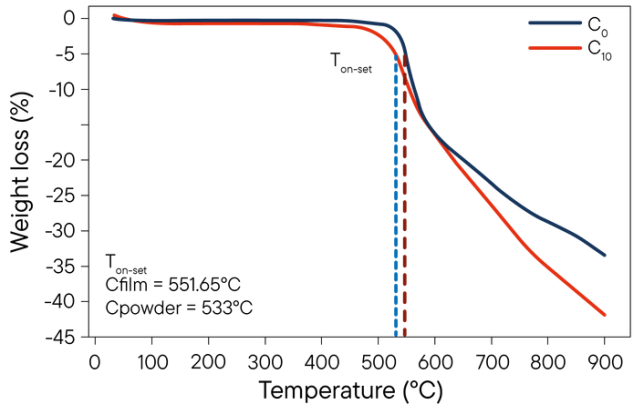
# Thermal Stability of Graphite Fabric/PAEK Composites

STA L82 Analysis of High-Performance Polymer Composites

High-performance PAEK composites combine excellent mechanical properties with high thermal stability, making them attractive for demanding structural applications. In this study, the LINSEIS STA L82 was used to compare graphite fabric reinforced PAEK composites produced by conventional film stacking and a novel PEI-assisted impregnation-co-film technique. The measurements reveal the influence of improved fiber–matrix bonding on the thermal stability of the composites.

## Measurement Setup

- Instrument: LINSEIS STA L82
- Material: Graphite Fabric Reinforced PAEK
- Samples: $C_0$ and PEI-modified $C_{10}$
- Temperature Range: RT–900 °C
- Heating Rate: 10 °C/min
- Atmosphere: Air




The thermogravimetric measurements reveal high thermal stability for both graphite fabric/PAEK composites.

Key observations include:

- $C_0$ decomposition onset at 551.65 °C
- $C_{10}$ decomposition onset at 533 °C
- Slightly reduced thermal stability after PEI modification
- Distinct high-temperature mass-loss behavior

The results show that PEI incorporation reduces the decomposition onset by approximately 18 °C, while enabling improved composite processing and interfacial properties.

## Interpretation

The observed behavior can be attributed to:

- High thermal stability of the PAEK matrix
- Lower thermal stability of added PEI
- Modified fiber–matrix interface

This results in:

- Slightly reduced decomposition temperature
- Reliable comparison of composite formulations
- Defined high-temperature performance

## Industrial Relevance

Thermogravimetric Analysis supports:

- High-performance composites
- Aerospace components
- Automotive applications
- Structural polymer materials
- Composite process optimization
- Quality control

## Conclusion

The LINSEIS STA L82 enables reliable characterization of the thermal stability of graphite fabric reinforced PAEK composites. The measurements reveal a moderate reduction in decomposition onset after PEI modification, while the overall study demonstrates substantial improvements in interfacial and mechanical properties. Thermal analysis therefore provides essential data for balancing thermal stability, processing and performance in advanced composite development.



Source:
Marathe, U., Padhan, M., Bijwe, J.
Graphite fabric reinforced PAEK composites by novel impregnation-co-film technique.
IOP SciNotes, 2020, 1, 014001.
Adapted from thermogravimetric measurements performed using a LINSEIS STA PT 1000 (now designated as STA L82).