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To meet the ever-growing demand of biobased and biodegradable plastics more companies and research institutions are investing in the research, development and supply these plastics. The incorporation of additives enhances the mechanical, thermal, barrier properties, processability resulting in a wider range of applications. Biochar or Biocarbon is a compound that can alter these properties of a polymer but also has the added benefit of having a black color and even blocking UV-light. It is also like carbon black, a product used to make mulch film more resilient and make it UV-light blocking. [1]  
The goal of this research is to analyze the effect biocarbon has on the physical and thermal properties of 3 biobased polymers PBSA, Solanyl and Bioflex.

## Methodolgy

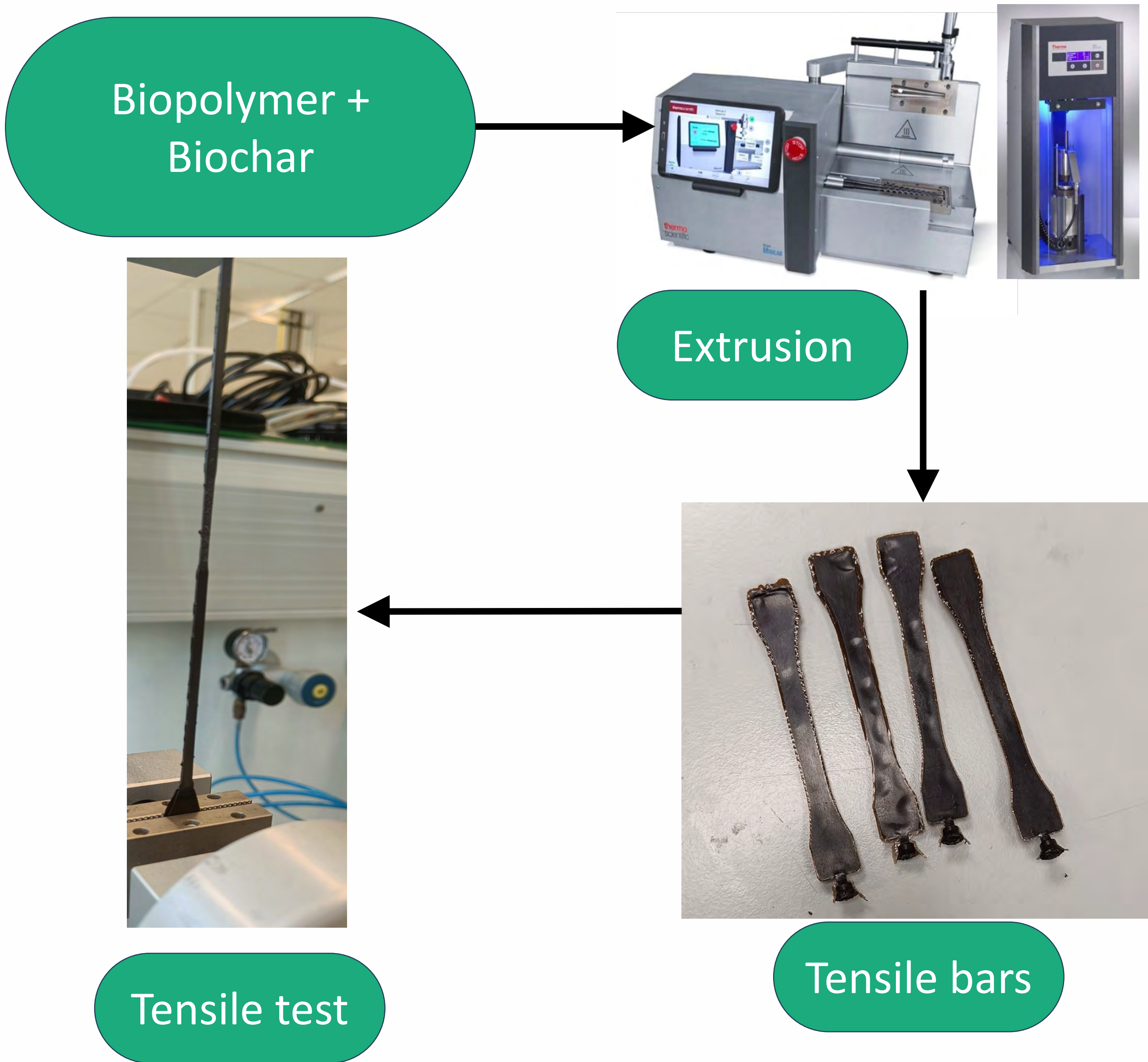


Figure 1: making and analysing tensile bars

Apart from Tensile testing TGA and DSC was also performed on the Biopolymer/Biochar composite

## Results

Below are the results of the tensile tests summed up. For both PBSA and Bioflex the results indicate that adding biochar to the polymer makes it more brittle and less resilient against being stretched apart.

	average Young modulus in MPA	average ultimate strength in MPA	Average elongation at break in %
PBSA pure	310	26	271
PBSA/3%Bamboo biochar	308	22	195
bioflex pure	167	12	334
bioflex/3%wood biochar	174	13	285

Figure 2: tensile test results

From TGA analysis it can be seen the temperature where most of the PBSA is degrading is ~30 °C higher. Therefore, the PBSA with biochar is thermally more resilient. DSC, however, does not showca:

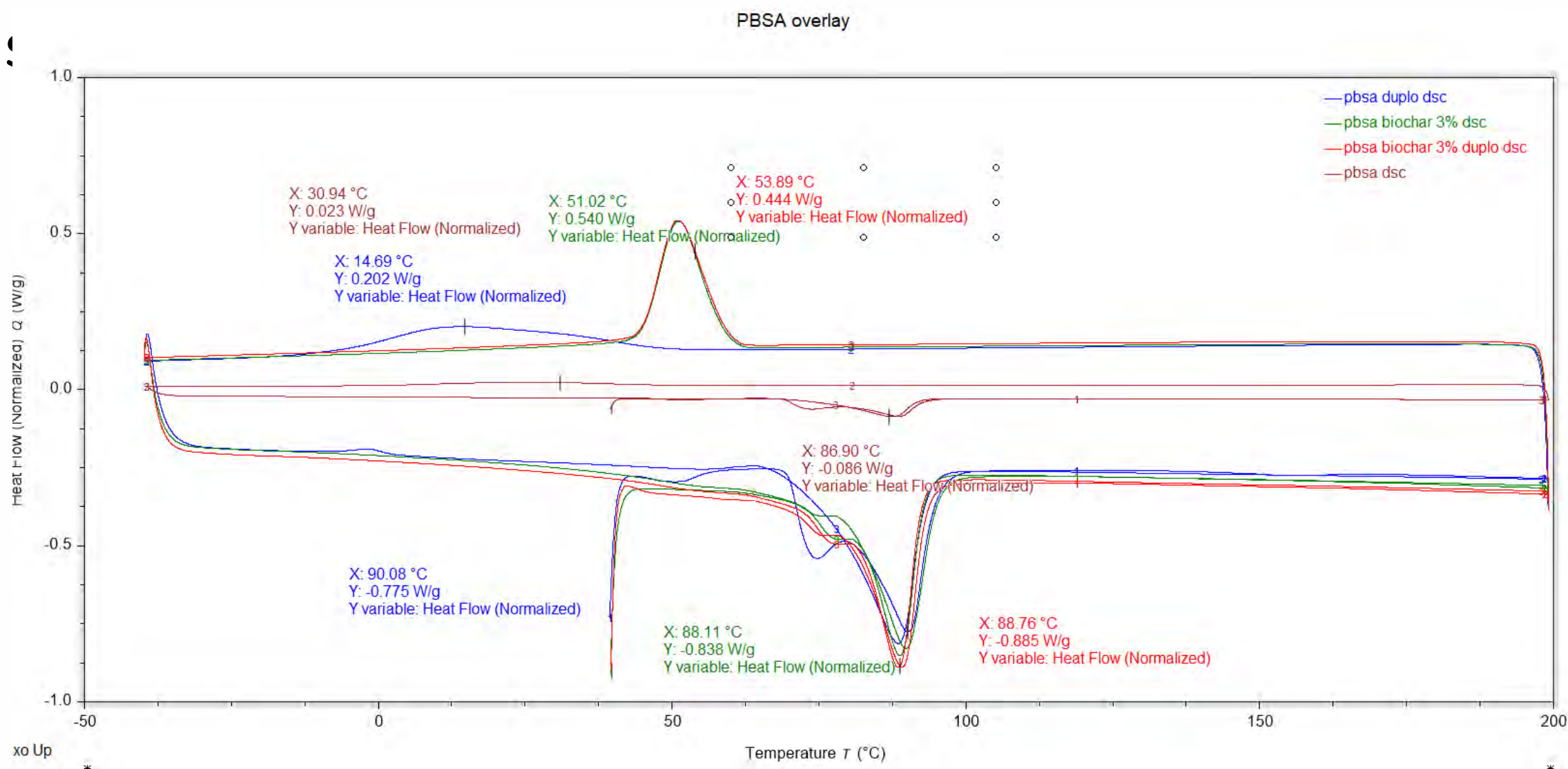


Figure 3:DSC of PBSA

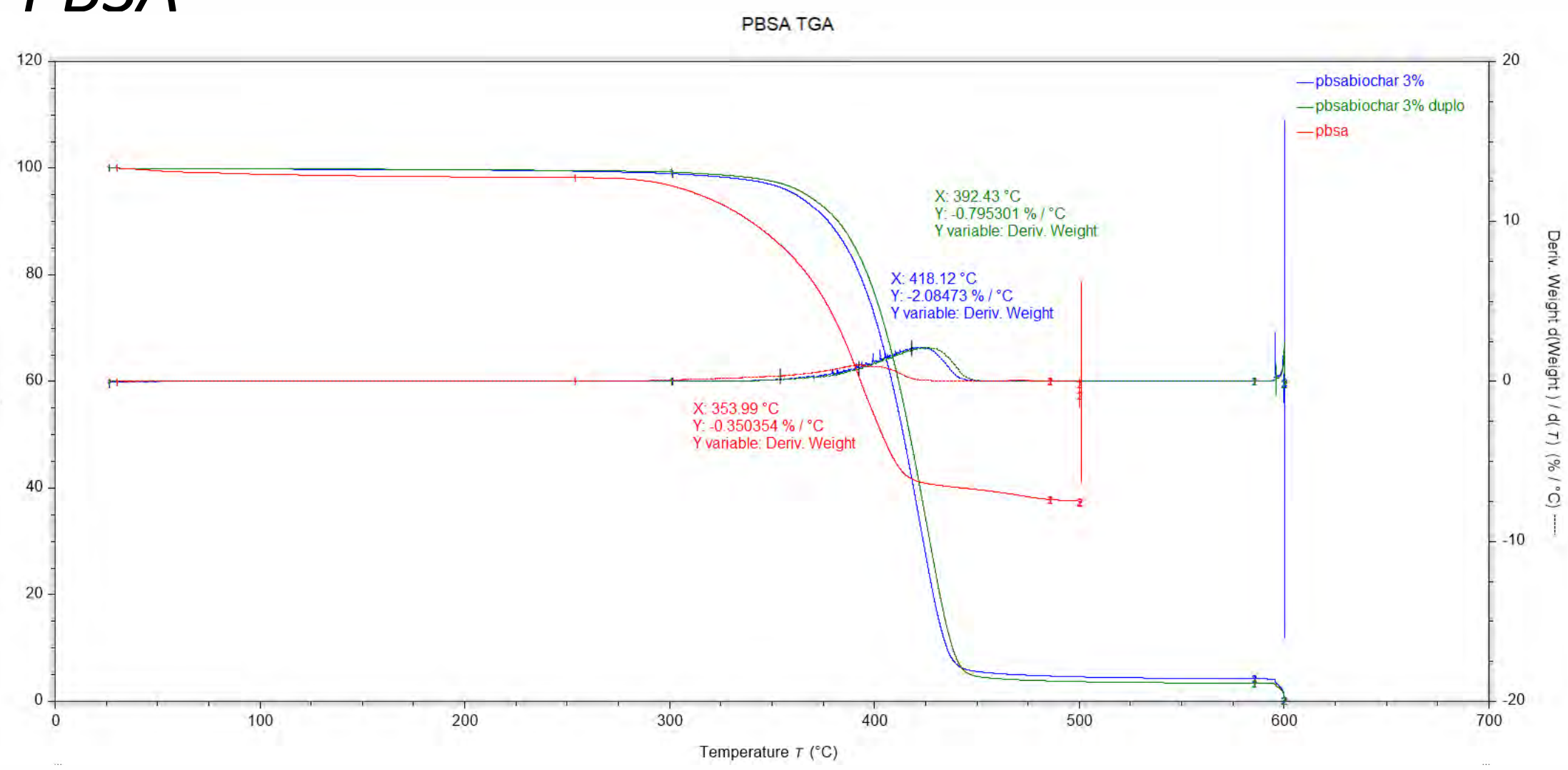


Figure 4:TGA of PBSA

## Design guidelines

The addition of biochar increases the stiffness and thereby also the brittleness of PBSA and Bioflex. The thermal stability of PBSA and bioflex is also increased as a result of adding Biochar.

This effect is similar to the effect biochar has on PLA gathered from previous research.

Most this effect shall also be perceived with Solanyl/biochar composite

## References

1.[1] Specialchem, "Carbon Black: How to Select the Right Grade for Plastics?," 18 2 2025. [Online]. Available: <https://polymer-additives.specialchem.com/selection-guide/selecting-carbon-black-for-plastics>.  
2.[2] M. Jansen, "Development of PLA composites," Mnext, Breda, 2025.