

Supporting Information for Article

Combustion Characteristics of Biomass Charcoals Produced at Different Carbonization Conditions. A Kinetic Study

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¹ This work is dedicated to the memory of Michael J. Antal, who participated in our project till the last days of his life.

Keywords: Spruce, forest residue, biomass, char, combustion, kinetics, reactivity, thermogravimetry.

Scope of this document: Illustrating the results of the corresponding journal article by suitable figures.

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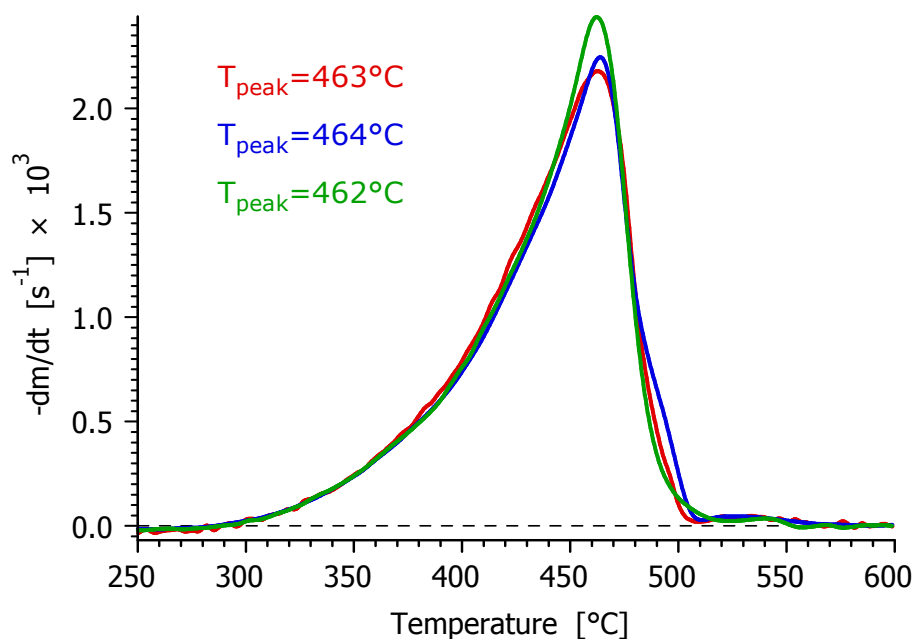
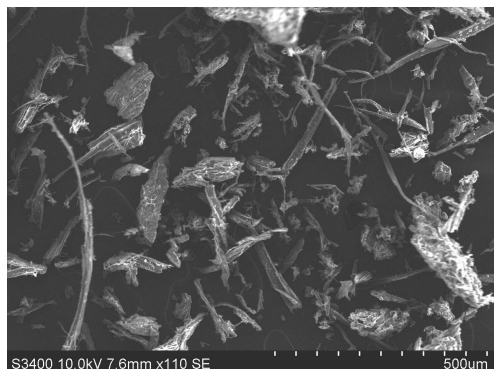
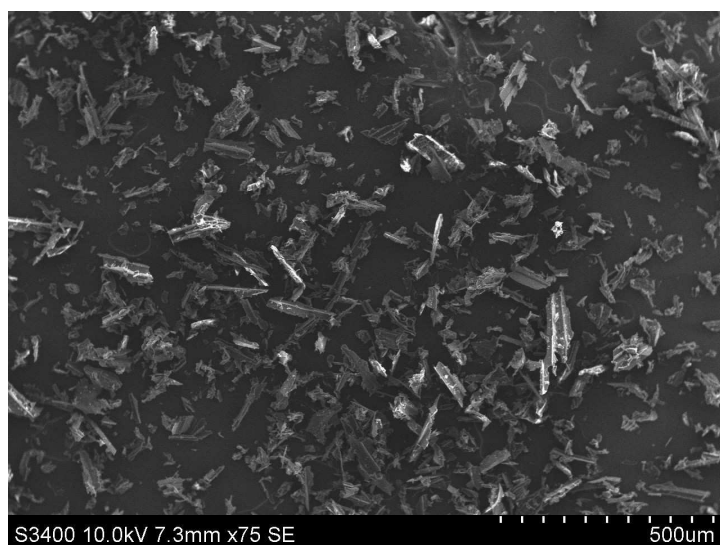


Figure S1. Repeatability of the experiments on char S500-1 at a heating rate of 10°C/min with an initial sample mass of 0.2 mg. The red-colored curve, measured in March 2015, was used in the kinetic evaluations. The blue and green curves were measured nine months later, in January 2016, from a batch of char S500-1 that was also prepared in January 2016.

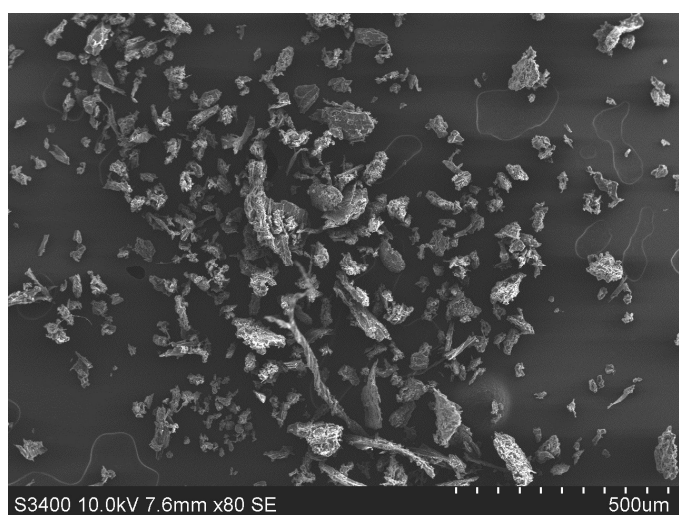
S500-1



Sfc-8



R500-1



Rfc-8

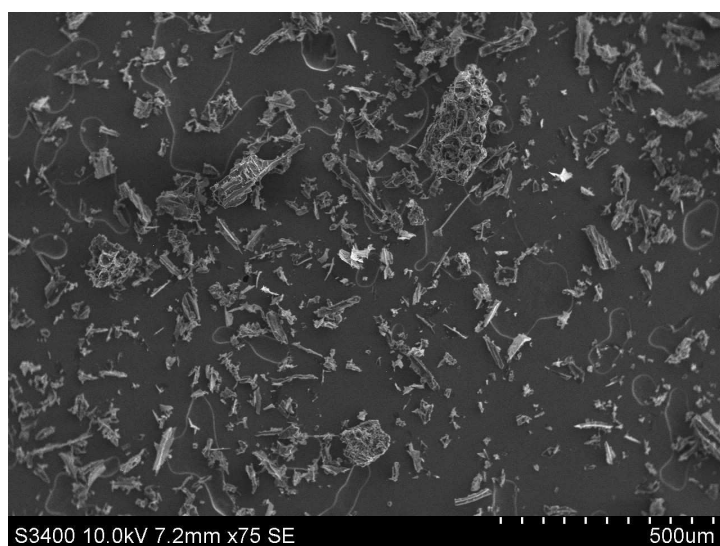


Figure S2. SEM images of the atmospheric pressure TGA chars (left) and the flash carbonization chars (right). The images on the left size were taken with a higher magnification. This difference was counterbalanced by the shrinking of the photos to the same scale, so that the particle sizes could easily be compered.

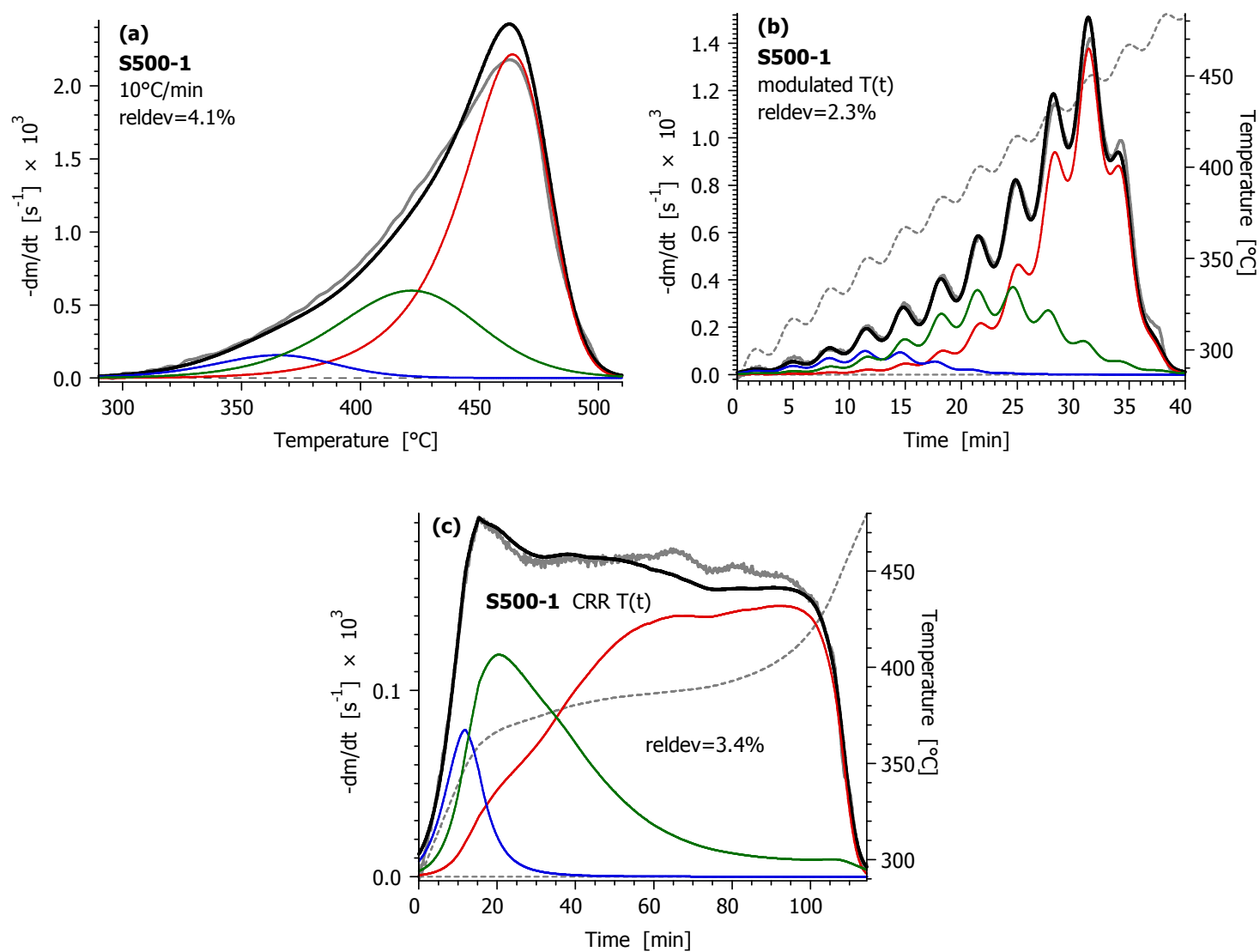


Figure S3. Partial curves and fit quality obtained for char S500-1 by Model Variant I. Notation: $-dm^{obs}/dt$ (---); $-dm^{calc}/dt$ (—); main reaction (—); side reactions (—); experimental T(t) curve (---).

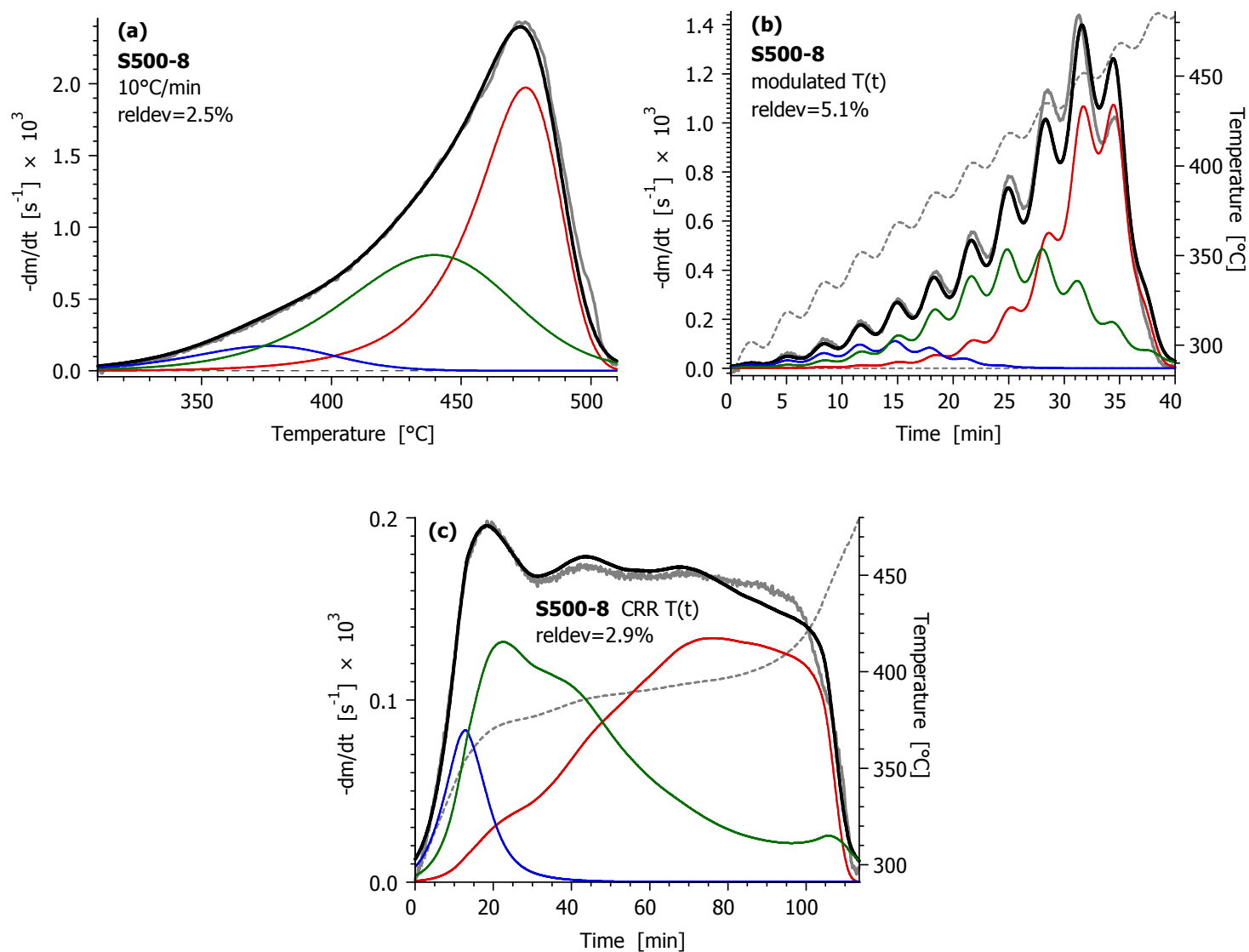


Figure S4. Partial curves and fit quality obtained for char S500-8 by Model Variant I. Notation: $-dm^{obs}/dt$ (—); $-dm^{calc}/dt$ (—); main reaction (—); side reactions (—); experimental $T(t)$ curve (---).

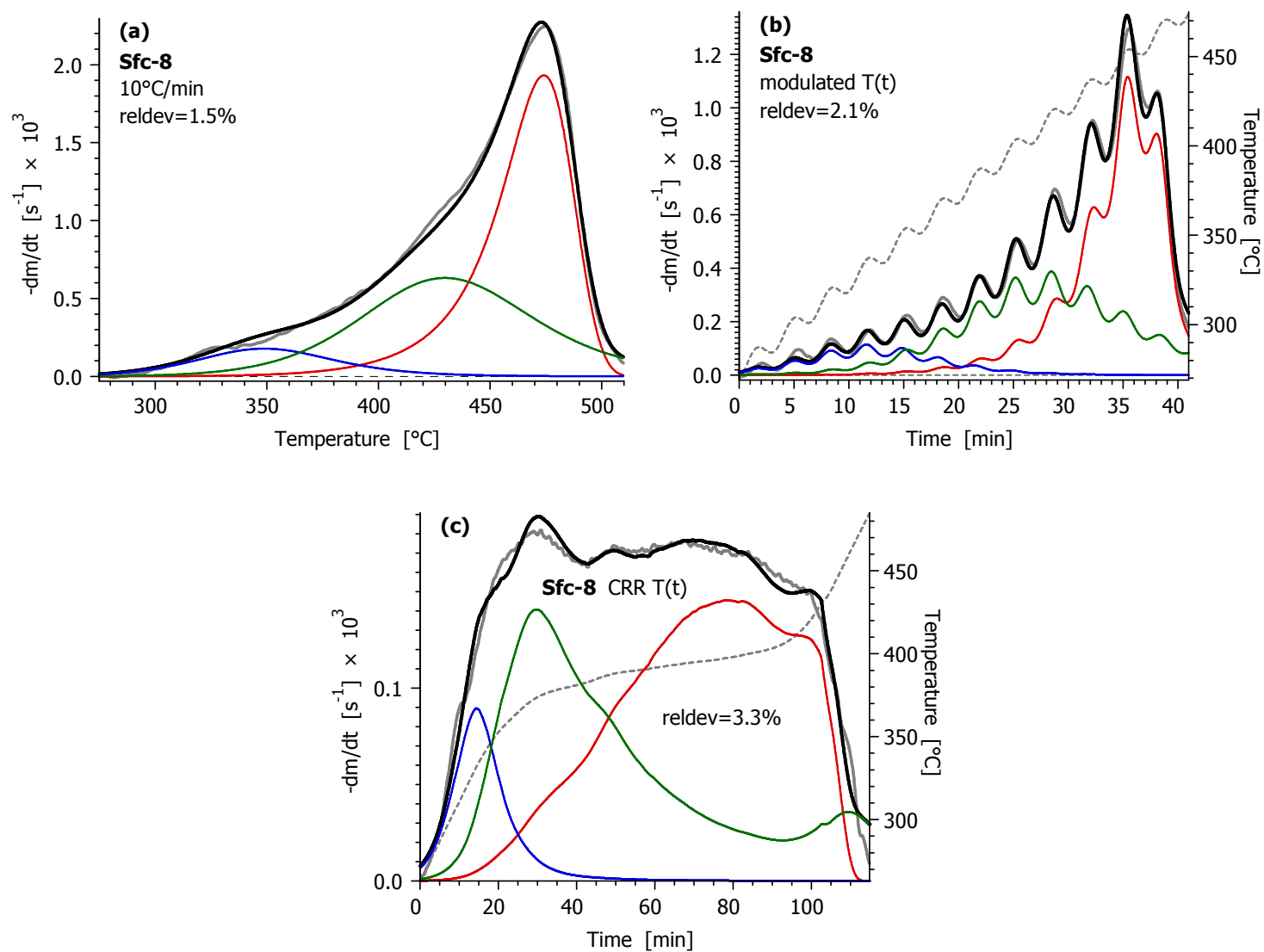


Figure S5. Partial curves and fit quality obtained for char Sfc-8 by Model Variant I. Notation: $-dm^{obs}/dt$ (—); $-dm^{calc}/dt$ (—); main reaction (—); side reactions (—); experimental T(t) curve (---).

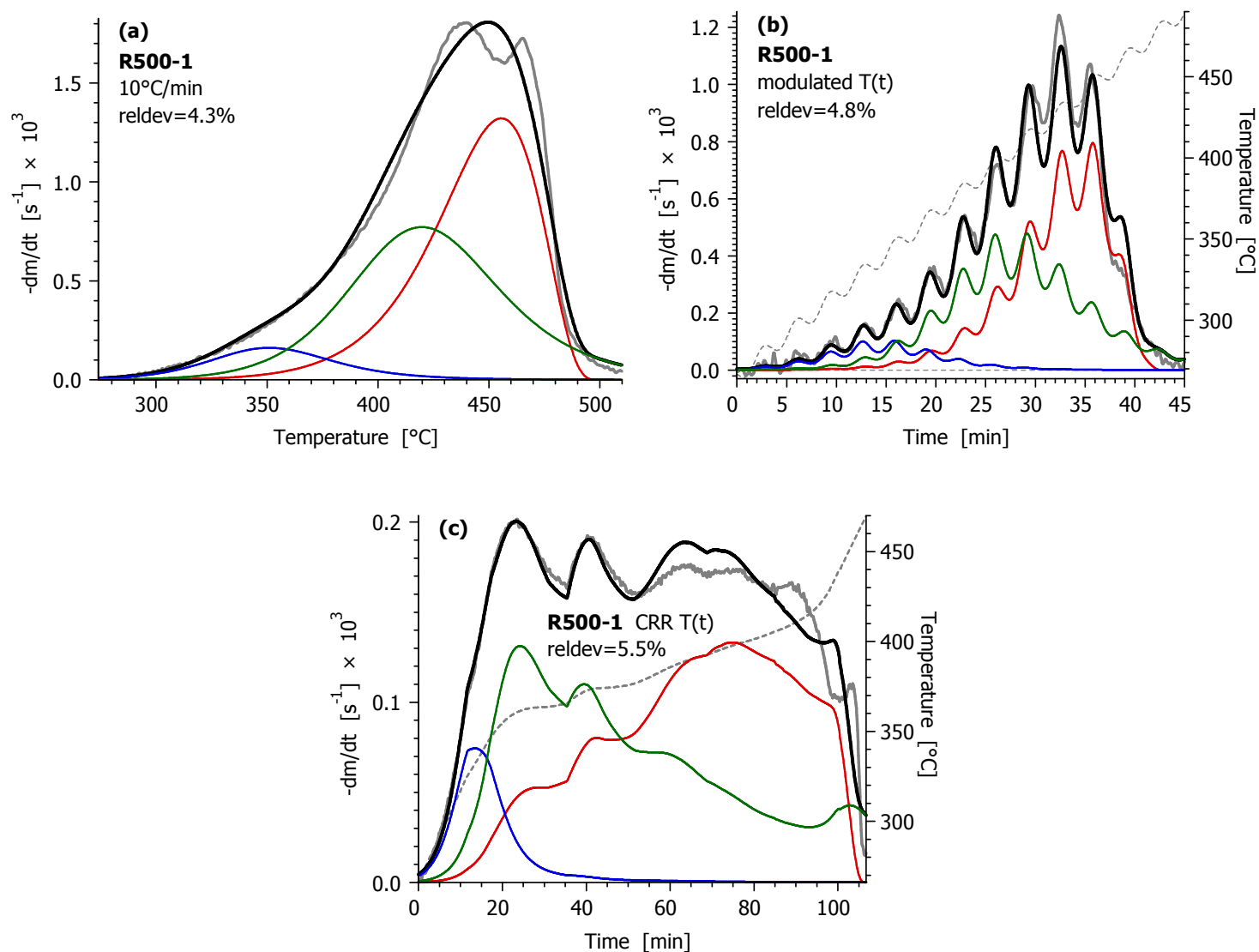


Figure S6. Partial curves and fit quality obtained for char **R500-1** by Model Variant I. Notation: $-dm^{obs}/dt$ (—); $-dm^{calc}/dt$ (—); main reaction (—); side reactions (—); experimental T(t) (---).

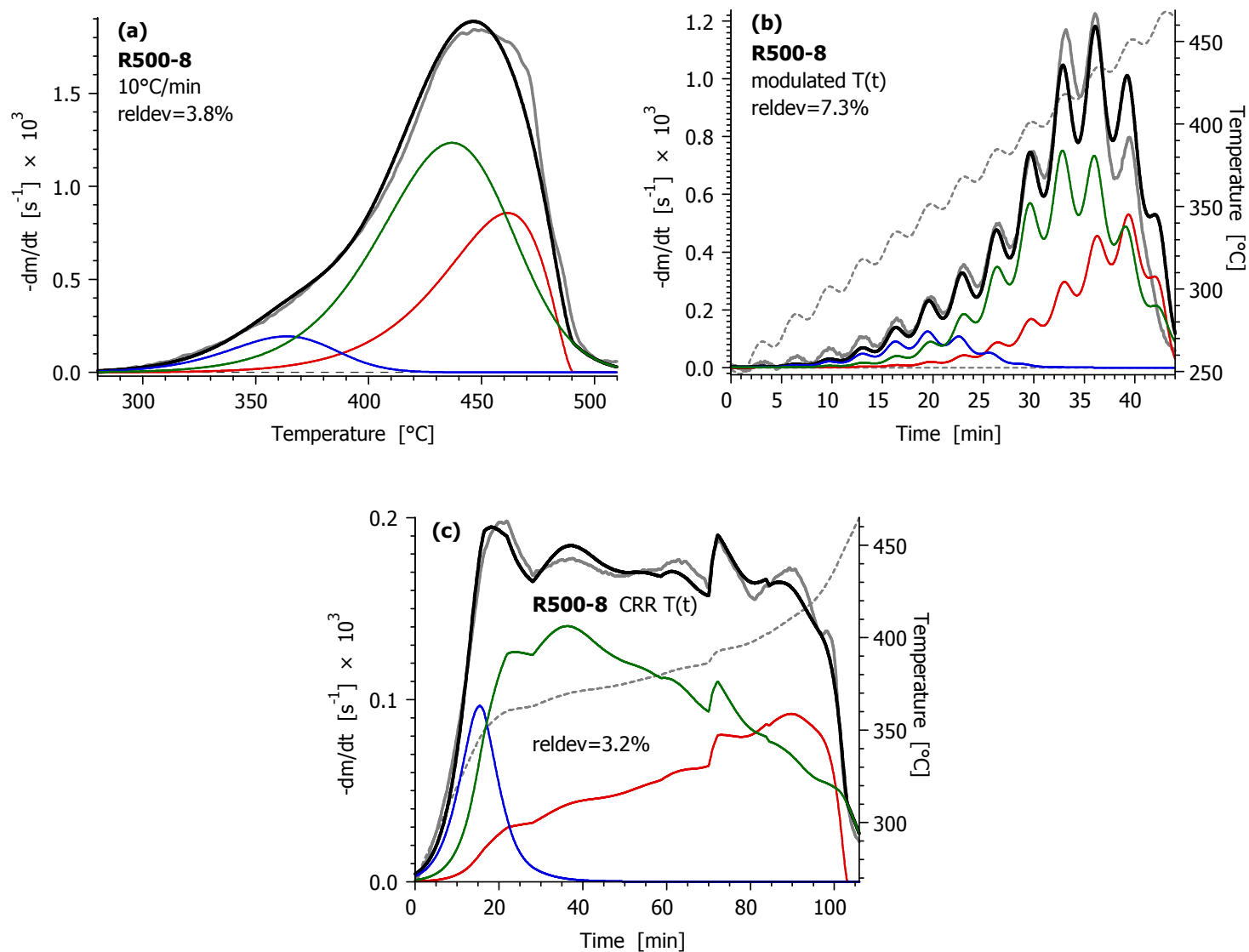


Figure S7. Partial curves and fit quality obtained for char **R500-8** by Model Variant I. Notation: $-dm^{obs}/dt$ (—); $-dm^{calc}/dt$ (—); main reaction (—); side reactions (—); experimental $T(t)$ curve (---).

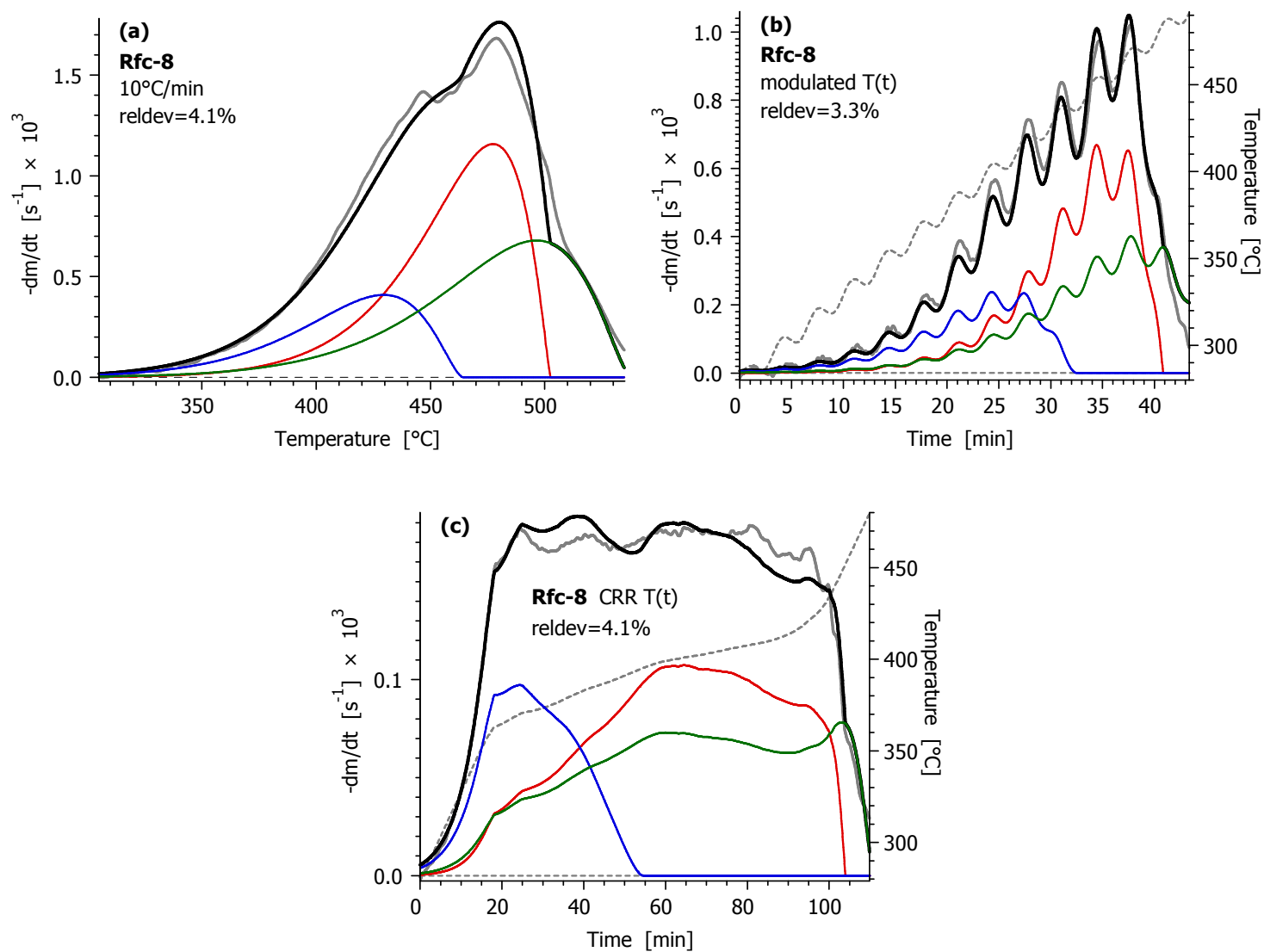


Figure S8. Partial curves and fit quality obtained for char **Rfc-8** by Model Variant I. Notation: $-dm^{obs}/dt$ (—); $-dm^{calc}/dt$ (—); main reaction (—); side reactions (—); experimental $T(t)$ curve (---).

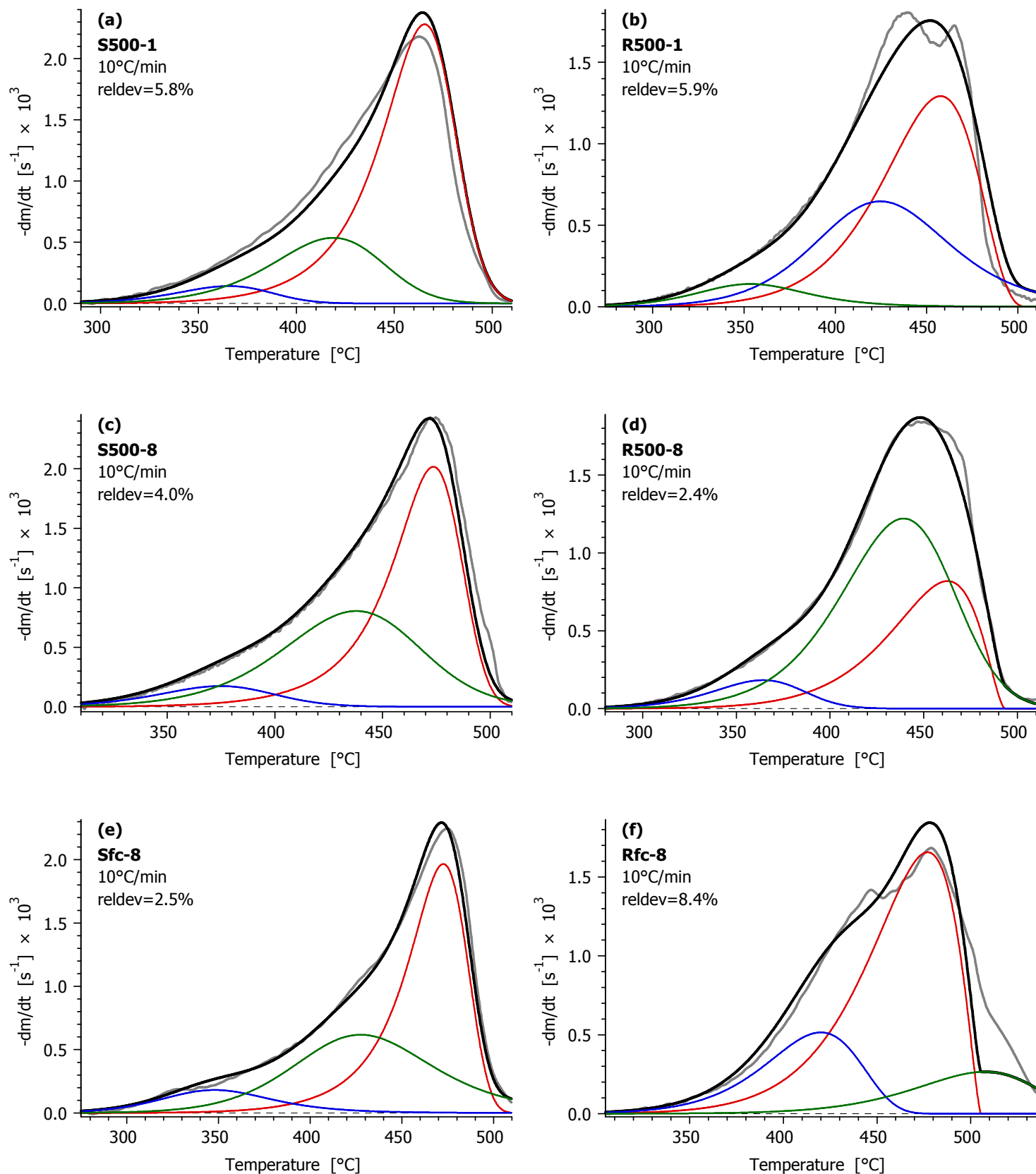


Figure S9. Partial curves and fit qualities obtained for the 10°C/min experiments when 18 experiments were evaluated by Model Variant II. Notation: $-dm^{obs}/dt$ (—); $-dm^{calc}/dt$ (—); main reaction (—); side reactions (—).