

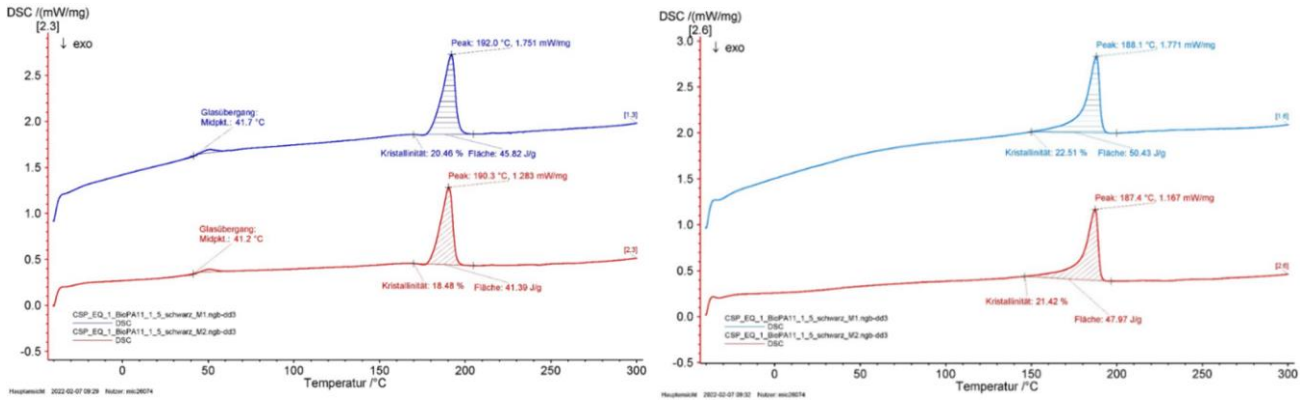
1 **Supplementary material**

2 **Differential Scanning Calorimetry (DSC)**

3 **Table S1. Melting points**

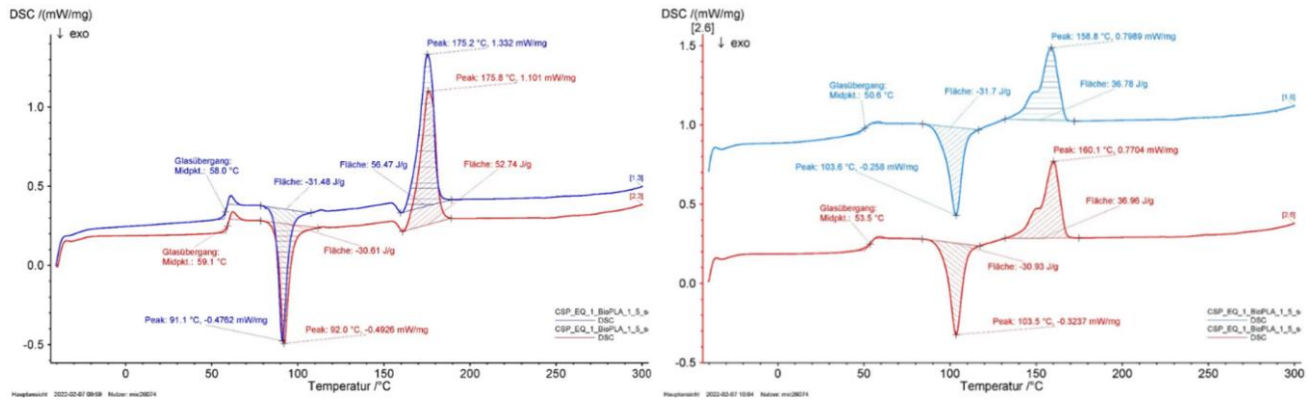
Material	Melting point / °C
PA11+1.5% carbon black	191
PLA+1.5% carbon black	175
PLA-Backsheet by Agfa	150

4



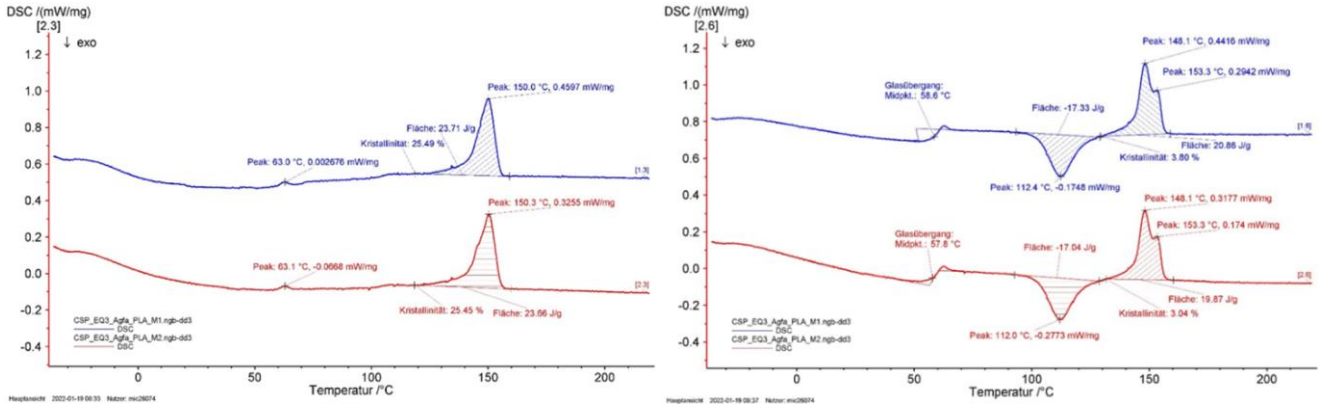
5

6 **Figure S1. DSC graph of PA11 with 1.5% carbon black. Left: 1. heating cycle, right: 2. heating cycle. Blue and red curves correspond to**
 7 **two different specimens.**



8

9 **Figure S2. DSC graph of PLA#2 +1.5% carbon black. Left: 1. heating cycle, right: 2. heating cycle. Blue and red curves correspond to two**
 10 **different specimens.**

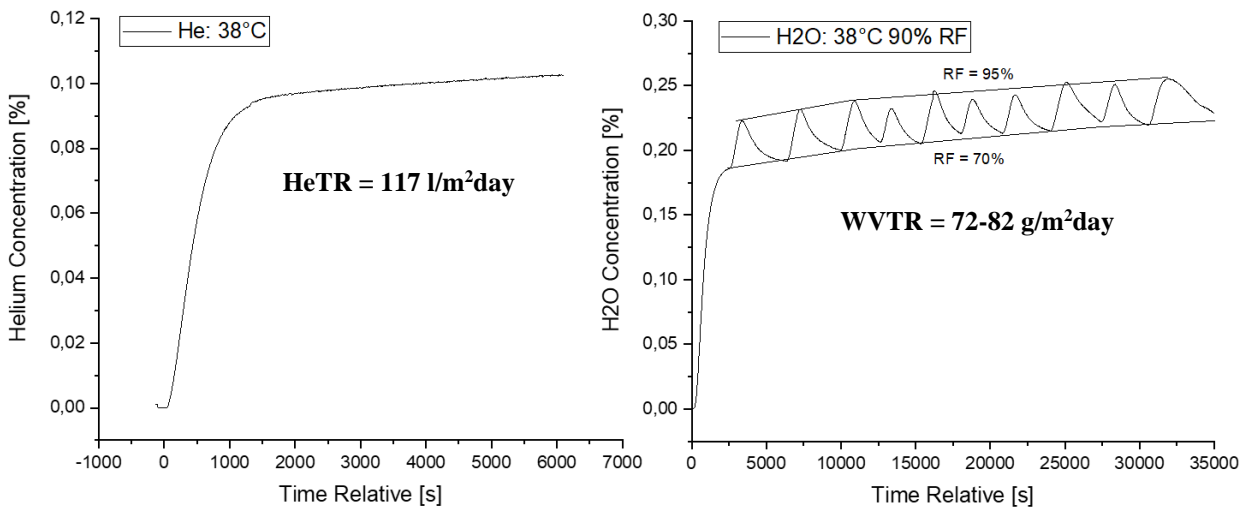


11

12 **Figure S3. DSC data of the PLA#3 Backsheet. Left: 1. heating cycle, right: 2. heating cycle. Blue and red curves correspond to two different**
 13 **specimens.**

14 **Permeation measurements**

15 The backsheet PLA#2 was tested on its barrier properties (see Figure S4). The assessment of barrier properties was conducted
 16 using quickly permeable helium and water vapor in the form of corresponding transmission rates (HeTR and WVTR,
 17 respectively). HeTR was found to be 117 l/m²day, whereas WVTR 72-82 g/m²day depending on the used relative humidity. One
 18 can compare those values with the corresponding values of other typical backsheet materials. For example, PET showed a HeTR
 19 of 0,3 l/m²day and WVTR < 1 g/m²day in our experiments. Thus, the PLA#2 backsheet shows a worse performance than PET
 20 by 2-3 orders of magnitude. As a result, a lot of water ingress can be expected which is directly reflected in a higher module
 21 degradation rate, observed in the sequence B.



22

23 **Figure S4. Gas permeation data for PLA#2. Left: Helium permeation, Right: water vapor permeation.**

24

25 **Evaluation of bending tests**

26
27 The test setup of the 3PB test for the wood-based frame material is shown in Figure S5. The flexural modulus $E_{Modulus}$
28 indicates the stiffness of the material and is calculated from the slope of the linear region of the force-deflection curve.
29

$$E_{Modulus} = \frac{l^3}{4 \cdot b \cdot h^3} \cdot \frac{\Delta F}{\Delta w}$$

30
31 b – width of sample

32 h – height of sample

33 l – length between supports

34 $E_{Modulus}$ – flexural modulus

35 ΔF – change of force

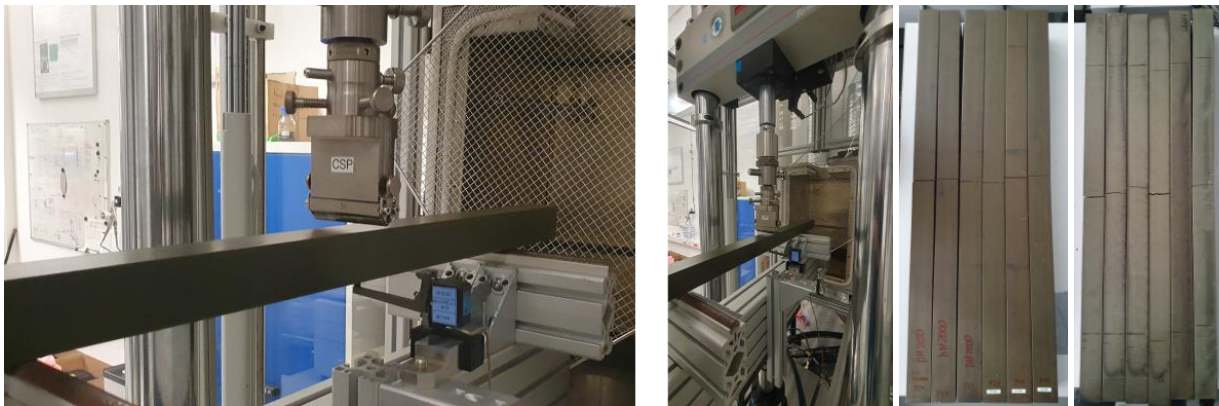
36 Δw – change of deflection

37
38 The elongation at break ε_B is calculated from the maximum deflection w_{max} that the test bar reaches before it breaks:
39

$$\varepsilon_B = 6 \frac{h}{l^2} w_{max}$$

40
41 The breaking stress σ_B is determined from based on the maximum force F_{max} by the following formula:
42
43

$$\sigma_B = \frac{3 \cdot l}{2 \cdot b \cdot h^2} F_{max}$$



46
47 **Figure S5. Test setup of the 3PB test, exemplary image of tested bars after DH2000 and HF10-2 (from left to right)**