Electronic Supplementary Material (ESI) for RSC Advances

Supplementary Information for

Multifunctional poly(ester urethane) laminates with encoded information

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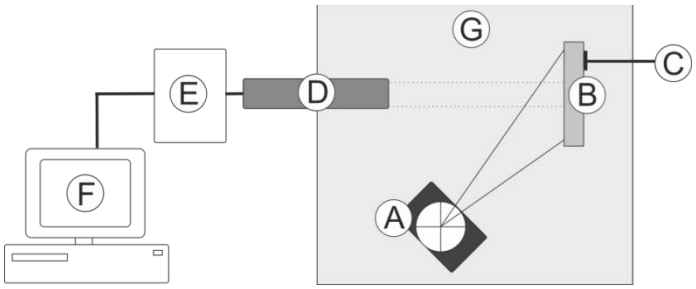

Fig. S1. Experimental setup for spectral analysis including light source (A), sample (B), thermo-sensing element (C), collector (D), modular spectrometer system (E), computer (F) and climate chamber (G). The used measuring geometry was 45°/ 0°. Therefore, the sample (B) was illuminated with a light beam (A) at an angle of 45° and the light-collecting lense system (D) was placed vis-à-vis to the sample. The whole setup was arranged in a climate chamber VCL 4006 from Vötsch Industrietechnik GmbH (G). The sample temperature was measured with a thermo-sensing element (C). The used spectrometer (MultiSpec from tec5; (E)) operated in a wavelength scan range from 730 to 360 nm; the used software was tec5 AdminTool (F).

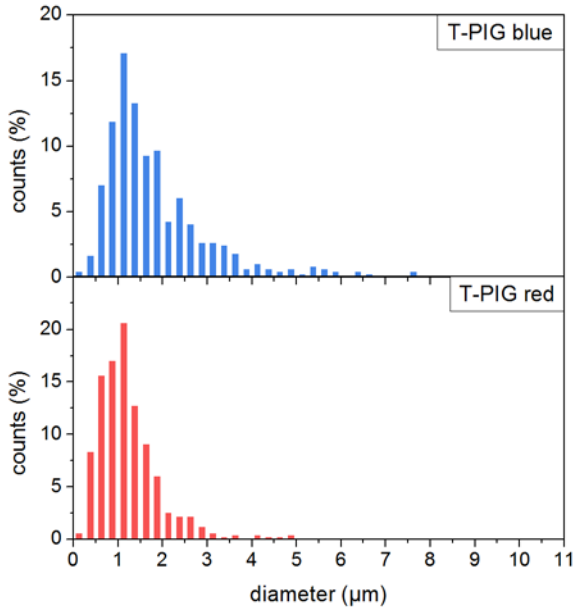

Fig S2. Size distribution of as-received powdery T-PIG blue and red as determined from SEM images. The mean particle size was about 1.8 µm for T-PIG blue and 1.2 µm for T-PIG red.

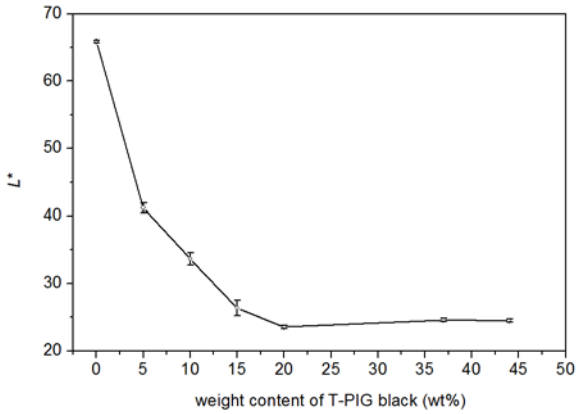

Fig. S3. CIELAB lightness *L** of PEU films loaded with different weight contents of T-PIG black. The films were investigated at 23 °C and characterized by a thickness of (95±10) µm.

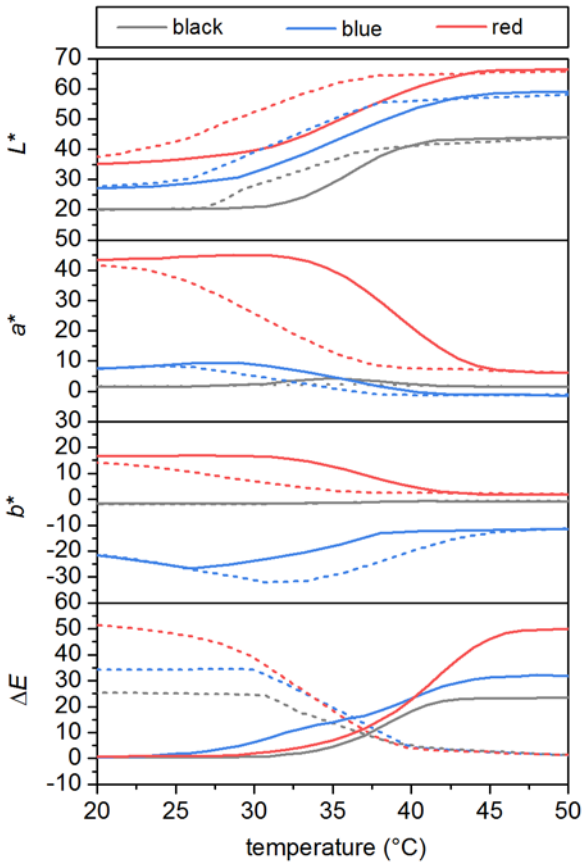

Fig. S4. Temperature-dependence of the colorimetric properties of PEU films, containing either 20 wt% of T-PIG black, blue or red. The thickness of the films was (95±10) µm. The temperature evolution in lightness *L**, the opponent color values *a** and *b** and the color difference Δ*E* is given during heating (continuous lines) and cooling (dashed lines).

Table S1. Calorimetric properties of solvent-cast PEU films with and without fillers during first heating (melting peak temperatures T_m and enthalpies ΔH_m) and cooling (crystallization peak temperatures T_c).

Sample	T_m (°C) [PBA]	ΔH_m (J/g) [PBA]	T_m (°C) [T-PIG solvent]	T_c (°C) [T-PIG solvent]
PEU film	54.5	38.7	n/a	n/a
PEU film loaded with 5 wt% T-PIG black	56.0	35.7	39.6	26.2
PEU film loaded with 20 wt% T-PIG black	55.5	34.8	41.0	27.8
PEU film loaded with 20 wt% T-PIG blue	53.5	n/a	43.0	28.9
PEU film loaded with 20 wt% T-PIG red	53.5	n/a	45.9	27.6