Fire behavior of flame retarded sandwich structures containing PET foam cores and Epoxy face sheets

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The FRs used in our previous work for the production of the foam cores [35] are listed in the following. As halogen-containing flame retardant, 1,2-Bis(tetrabromophthalimido ethane), further named HFR, supported as Saytex BT-93 (Albemarle, Charlotte, North Carolina, United States), was used. The three phosphorous based FRs used were: (I) Zinc diethyl phosphinate, supplied as Exolit OP950 (Clariant, Muttenz, Switzerland), further named DEPZn. (II) 6H-dibenz[c,e] [1,2]oxaphosphorin,6-[(1-oxido-2,6,7-trioxa-1-phosphabicyclo[2.2.2]oct-4-yl)methoxy]-, 6-oxide (DOPO-O-PEPA) supplied as DOPO-O-PEPA (Metadynea, Krems, Austria), further named DOP. (III) Pentaerythritol spirobis(methylphosphonate), supplied as AFLAMMIT PCO 910 (THOR, Speyer, Germany), further named PSMP. To improve the processability during the foam extrusion process, one of the samples containing PSMP was prepared containing a mixture of PSMP and Zinc Stearate (ZnSt) (Sigma Aldrich, St. Louis, Missouri, United States) in a ratio PSMP:ZnSt = 20:1. **Table S1** summarizes important characteristics of the PET Foam cores.

**Table S1.** Overview of the PET-Foam properties with regards to chain extender (CE) and FR content, the foam densities before (density sd.) and after calibration (density cal.), cell size and cell densities achieved with different PET foam cores prior to the foam calibration process and the results DSC 2nd heating ramp regarding glass transition temperature (Tg) melting temperature (Tm) and crystallinity are presented.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Sample | CE  [wt%] | FR [wt %] | Foam density sd.  [g l-1] | density  cal. [g l-1] | Average cell size  [μm] | Cell density  [cells mm3 -1] | Tg  [°C] | Tm  [°C] |
| CE-PET | 0.25 | 0 | 105 ± 5 | 157 ± 8 | 185 ± 62 | 4.44x105 | 81 | 242 |
| DEPZn-PET | 0.35 | 5 | 105 ± 2 | 193 ± 8 | 193 ± 65 | 3.79x105 | 82 | 242 |
| HFR-PET | 0.25 | 5 | 95 ± 2 | 253 ± 24 | 84 ± 32 | 6.30x106 | 82 | 240 |
| 2-PSMP-PETa) | 0.40 | 2 | 93 ± 4 | 221 ± 16 | 94 ± 40 | 2.36x106 | 79 | 243 |
| 3-PSMP-PET | 0.35 | 3 | 132 ± 10 | 401 ± 78 | 153 ± 66 | 8.97 x105 | 81 | 240 |
| 2 wt% DOP | 0.35 | 2 | 91 ± 4 | 245 ± 16 | 94 ± 40 | 4.21x106 | 80 | 243 |
| KDb) | - | - | 190 ± 15 | 190 ± 15 | 292 ± 176 | 8.27 x104 | 75 | 237 |

a) contains ZnSt in a 20:1 ratio PSMP:ZnSt, b) calibrated, evaluated in homogeneous region