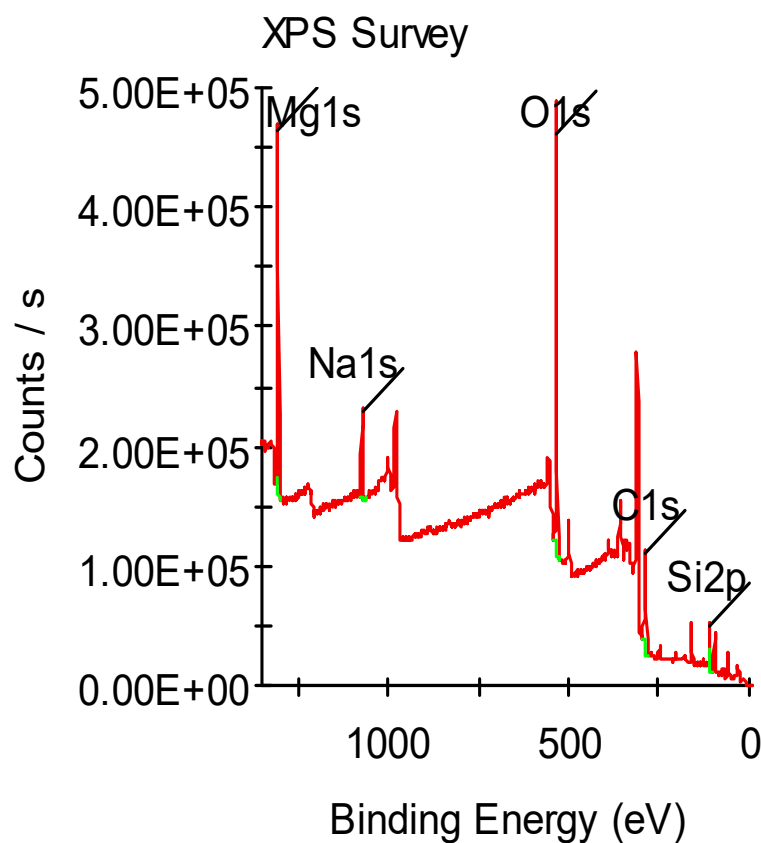


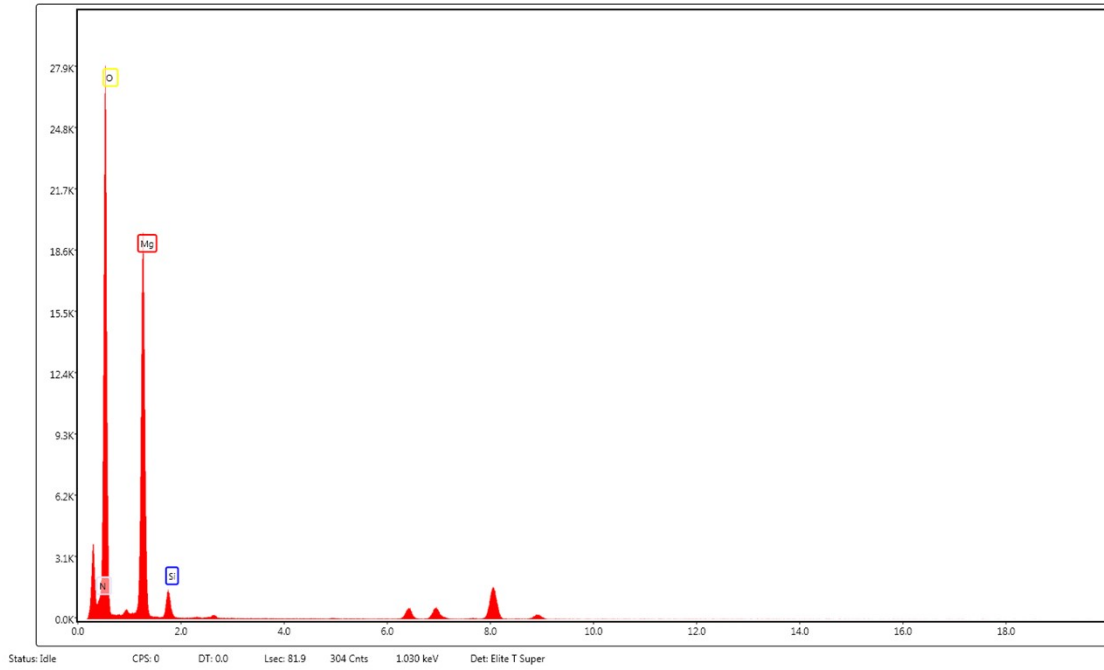
### Supplementary Information (SI)

#### Upcycling of Saline Lake Magnesium into Functionalized Si-MgO for Synergistic Fire-Safe PVC: A Waste-to-Wealth Strategy Coupling Catalytic Charring and Physical Insulation

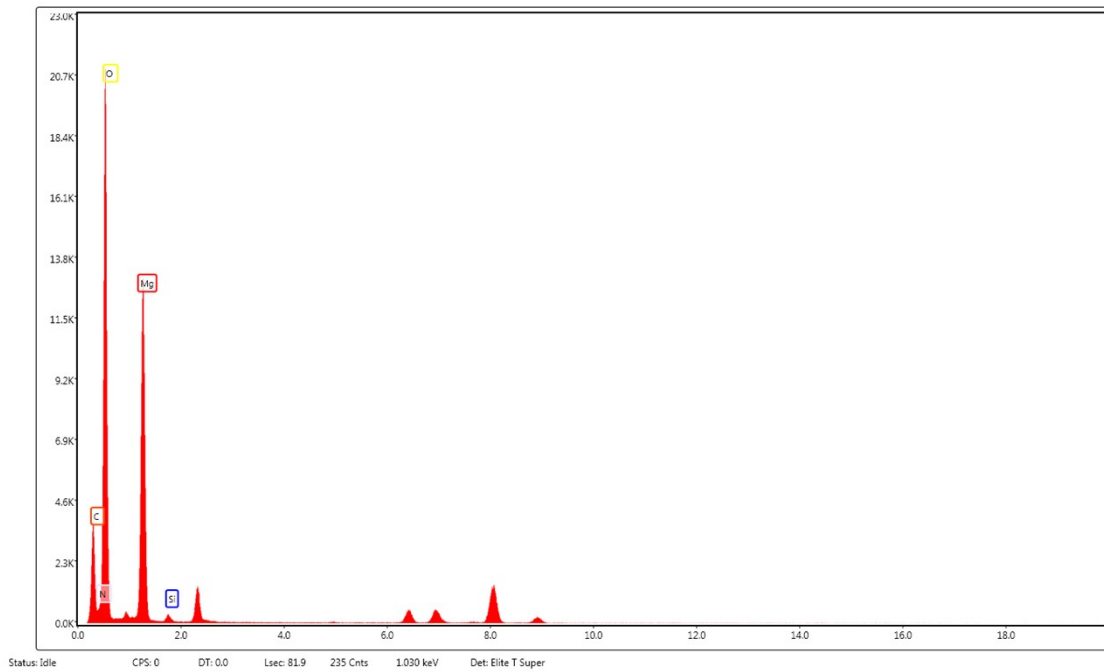
The following is the supporting information of this paper. This supporting information aims to provide supplementary experimental details, data analysis methods and auxiliary results of the core research described in the text to ensure the repeatability of the research and the integrity of the data.



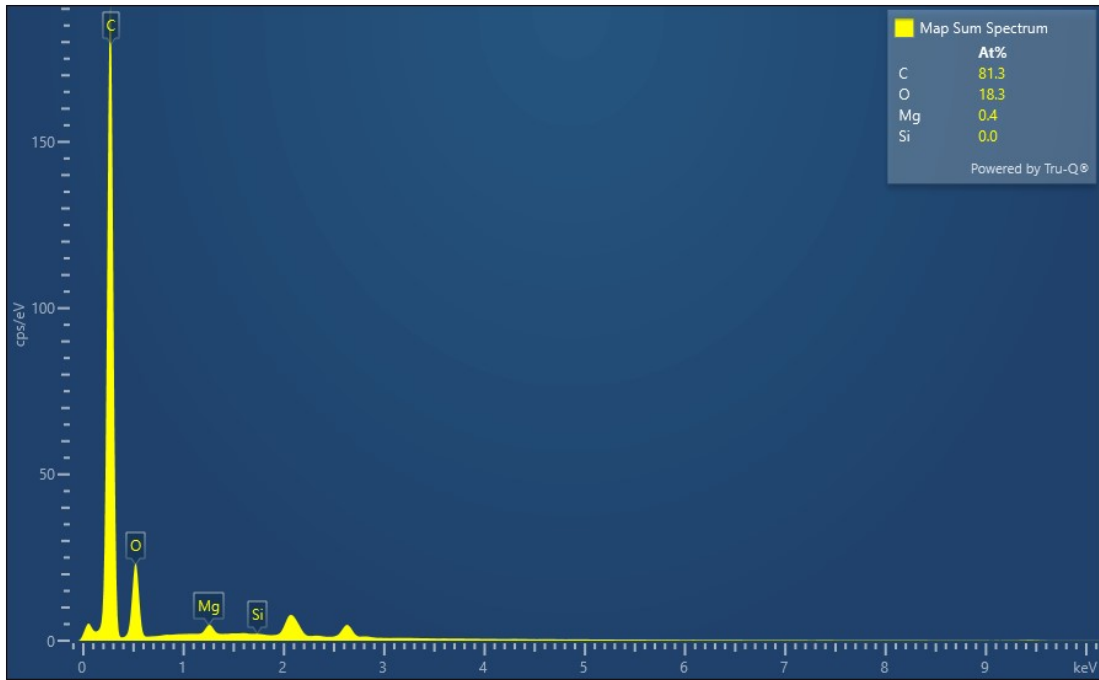
(S1) XPS data of Si-MgO



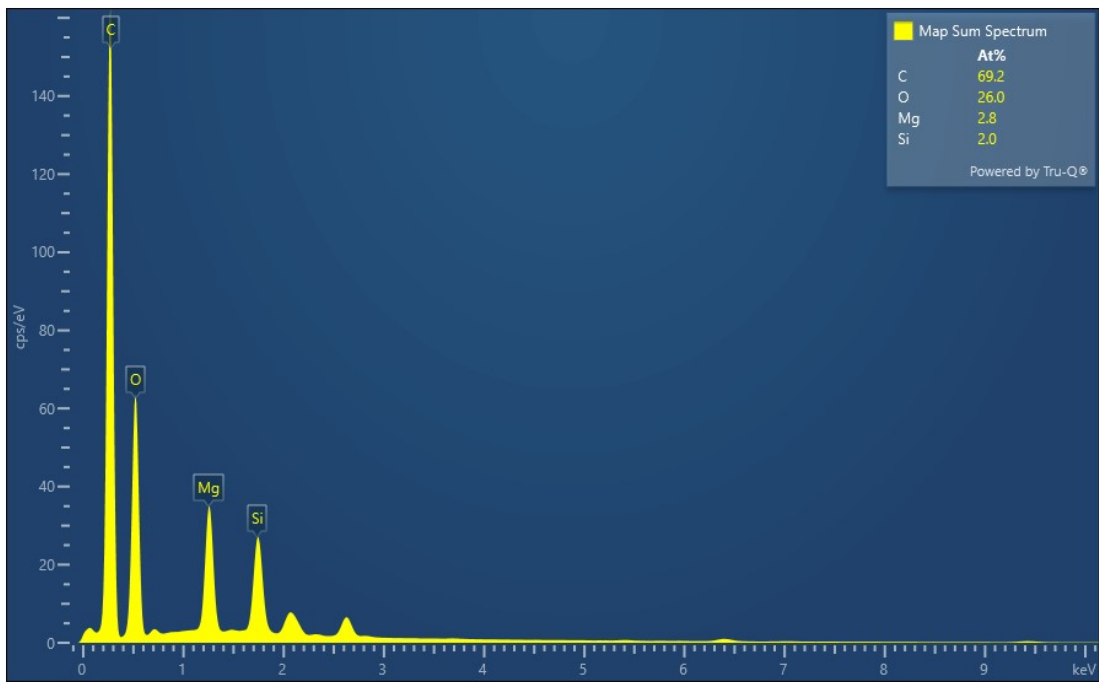
(S2) Si-MgO EDS element content analysis



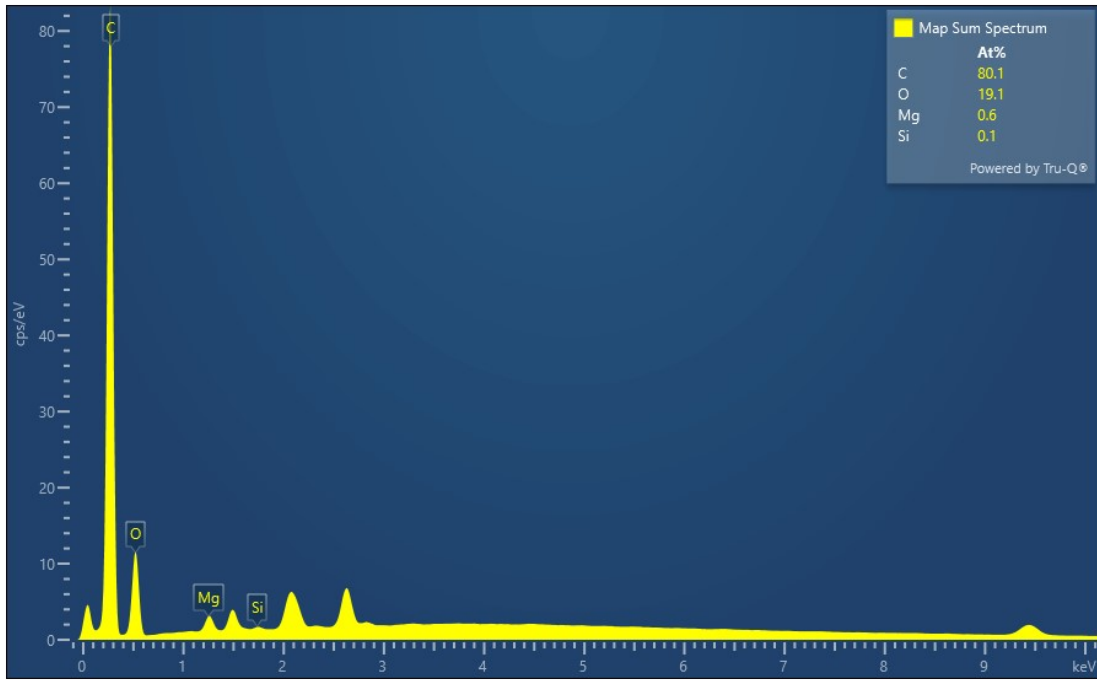
(S3) Si-MgO<sub>0.02</sub>-A-EG<sub>0.03</sub> EDS element content analysis



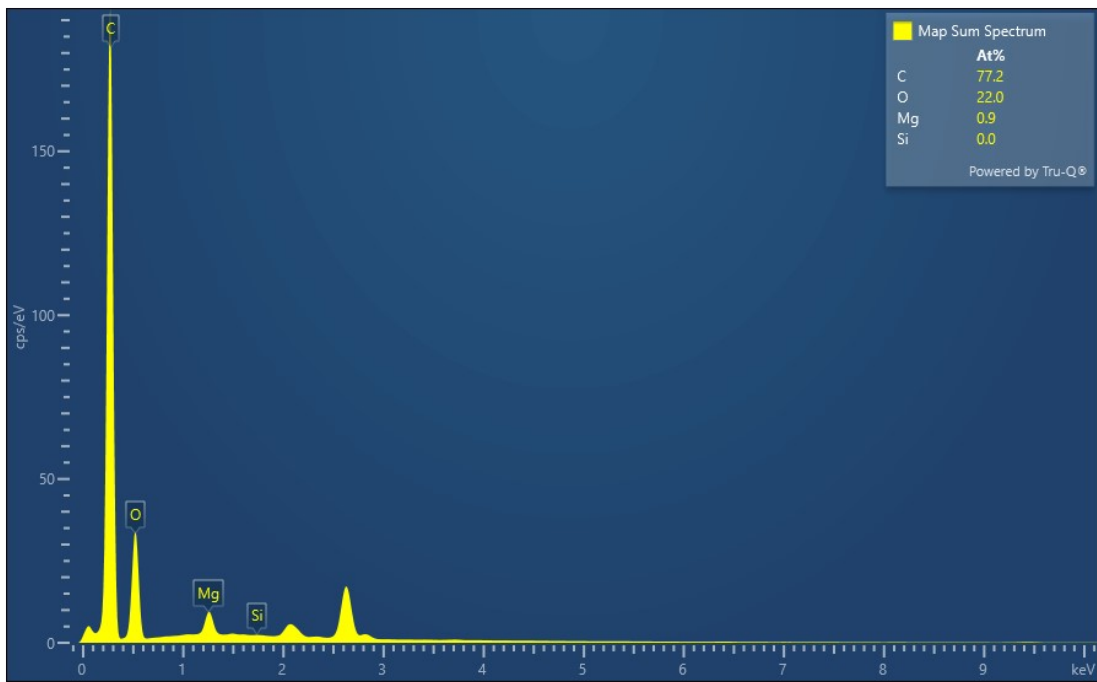
(S4) EDS residual carbon element content analysis of PVC



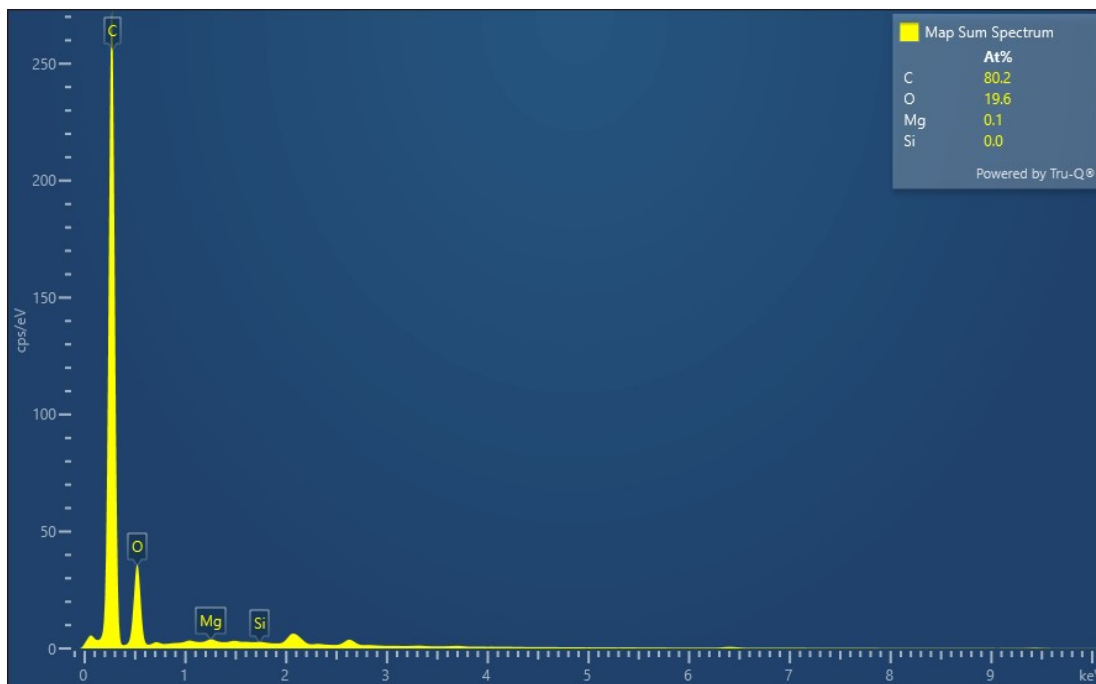
(S5) EDS residual carbon element content analysis of Si-MgO<sub>0.05</sub>/PVC



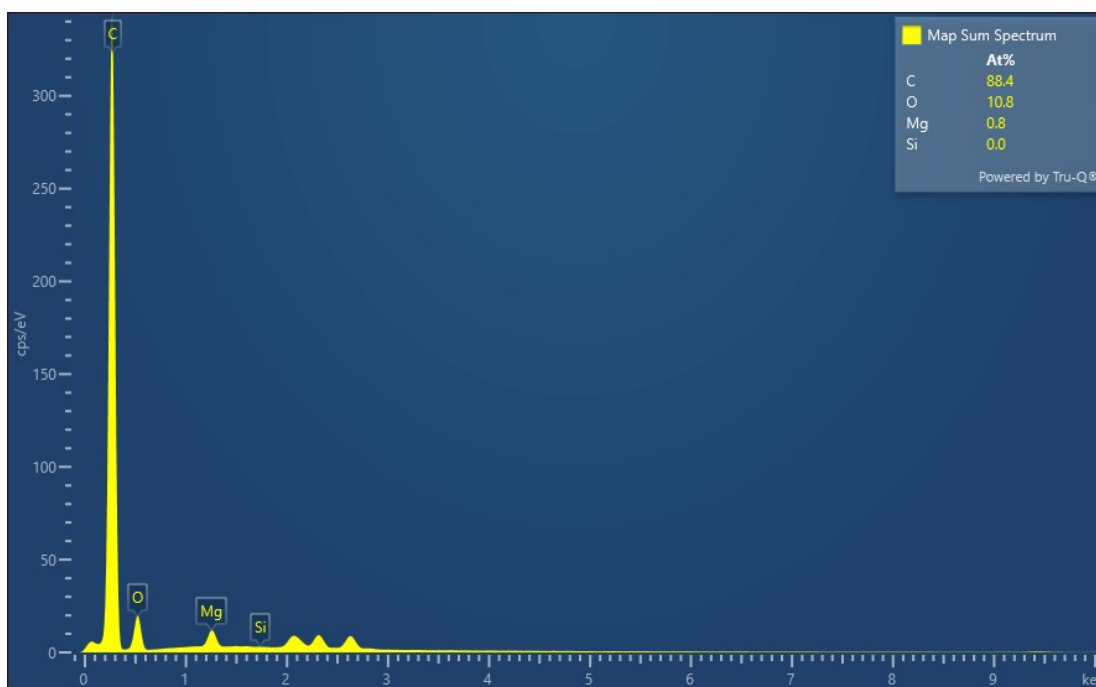
(S6) EDS residual carbon element content analysis of Si-MgO<sub>0.04</sub>-A-EG<sub>0.01</sub>/PVC



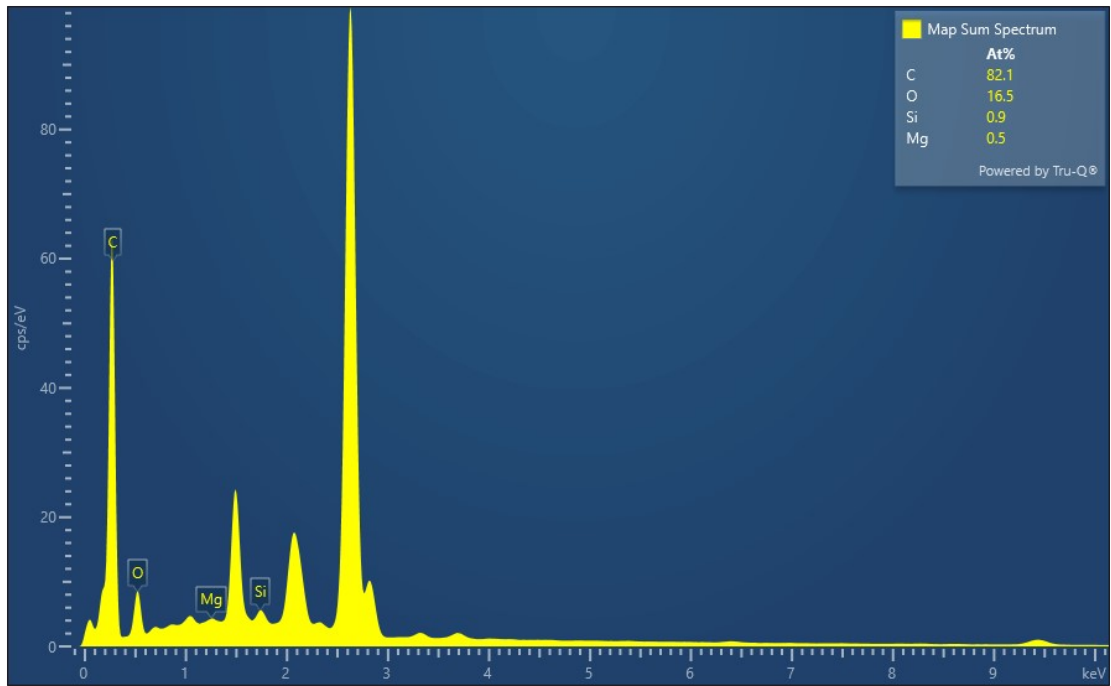
(S7) EDS residual carbon element content analysis of Si-MgO<sub>0.01</sub>-A-EG<sub>0.04</sub>/PVC



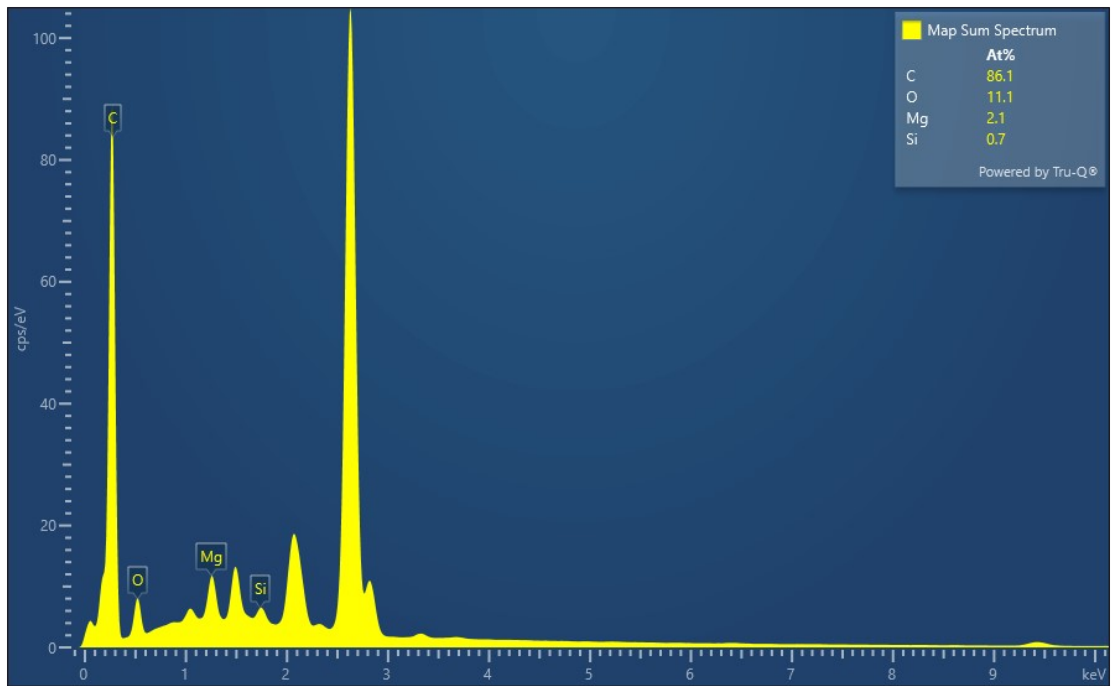
(S8) EDS residual carbon element content analysis of Si-MgO<sub>0.03</sub>-A-EG<sub>0.02</sub>/PVC



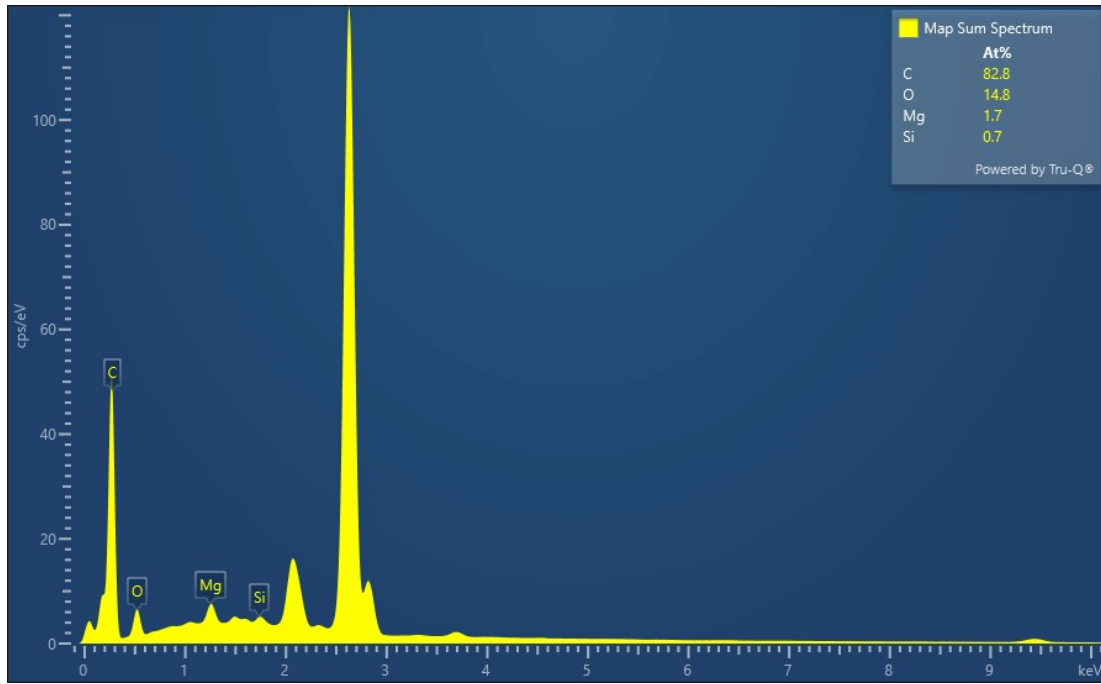
(S9) EDS residual carbon element content analysis of Si-MgO<sub>0.02</sub>-A-EG<sub>0.03</sub>/PVC



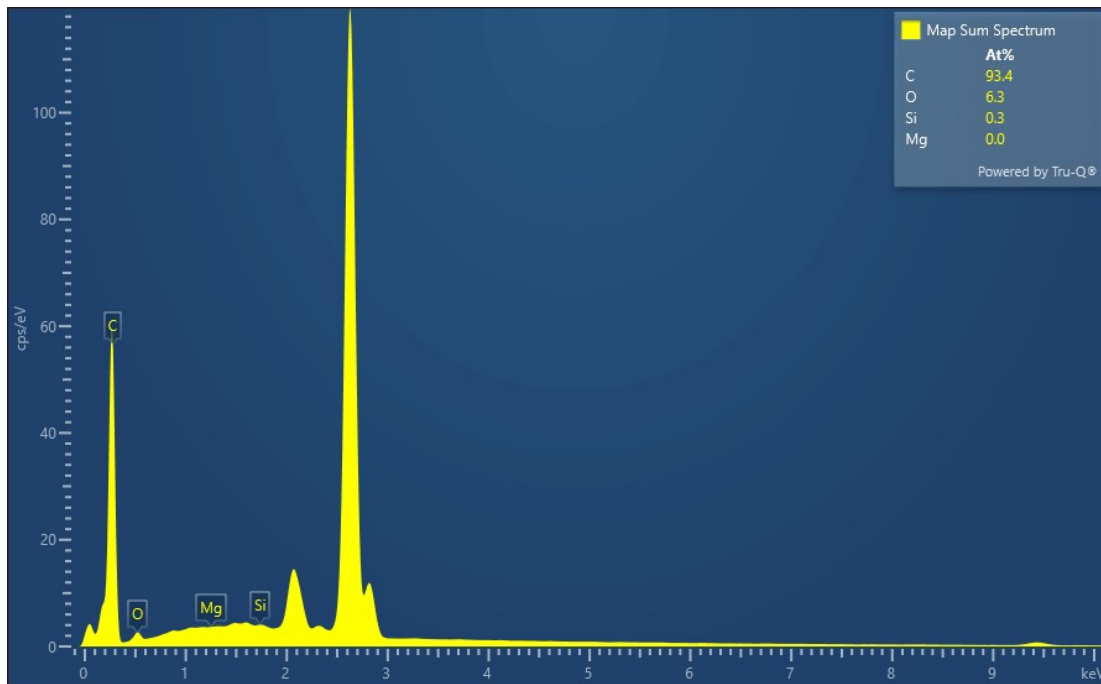
(S10) Analysis of EDS element content in cross section of PVC



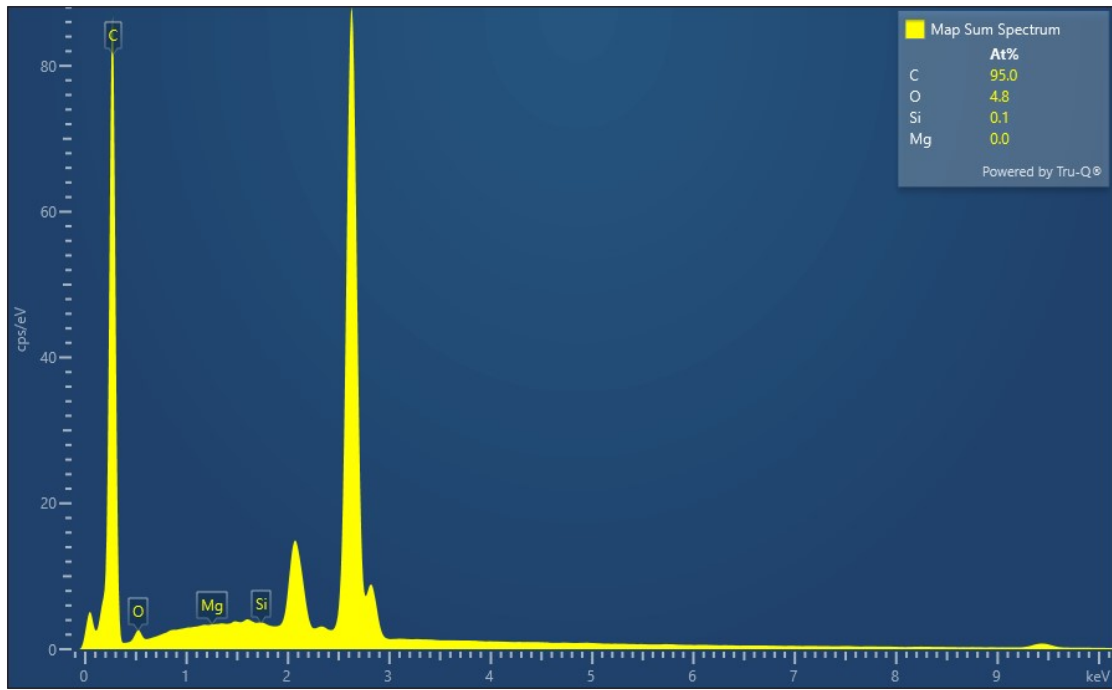
(S11) Analysis of EDS element content in cross section of MgO<sub>0.05</sub>/PVC



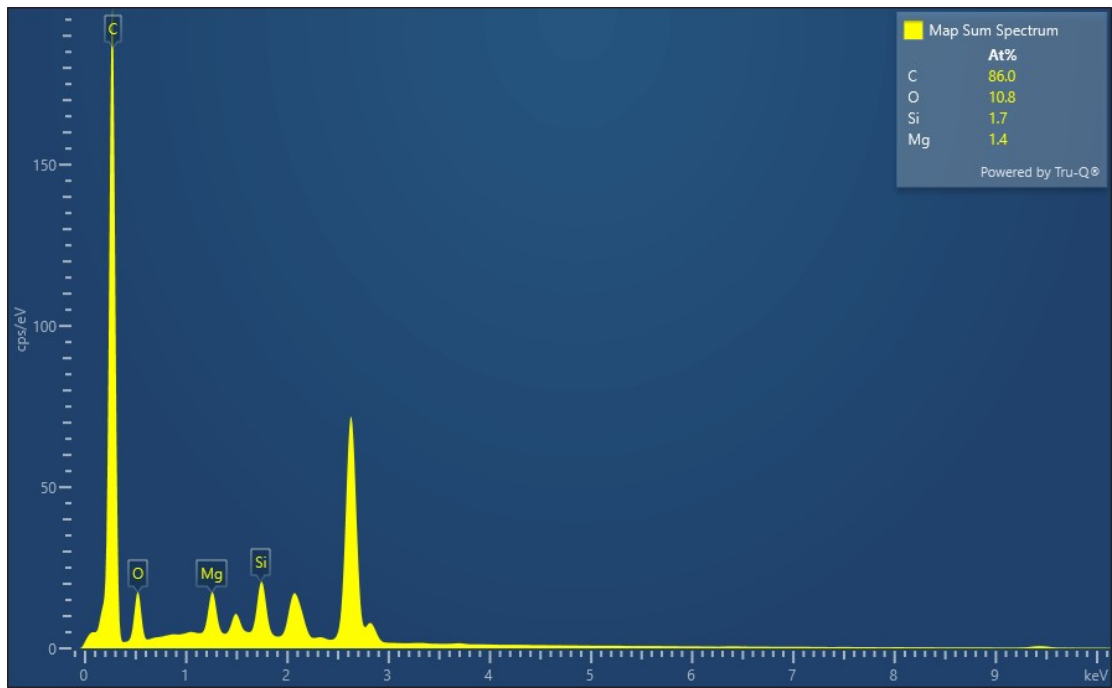
(S12) Analysis of EDS element content in cross section of Si-MgO<sub>0.05</sub>/PVC



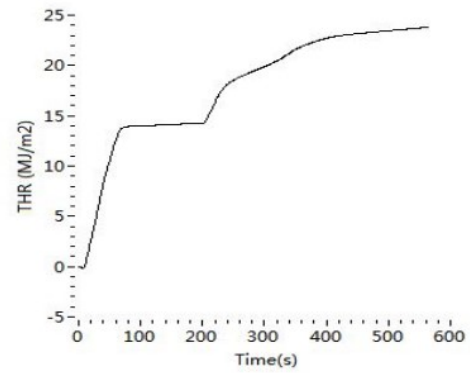
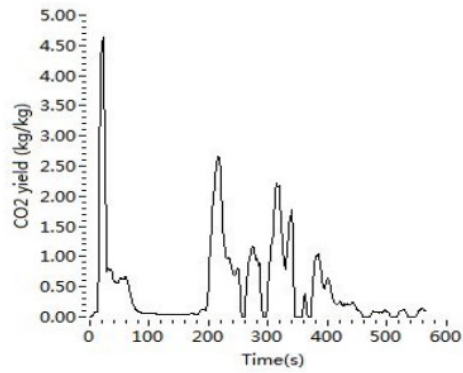
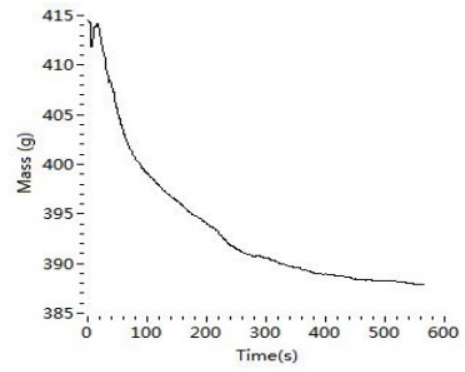
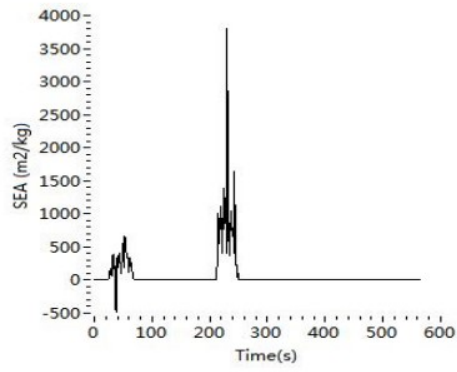
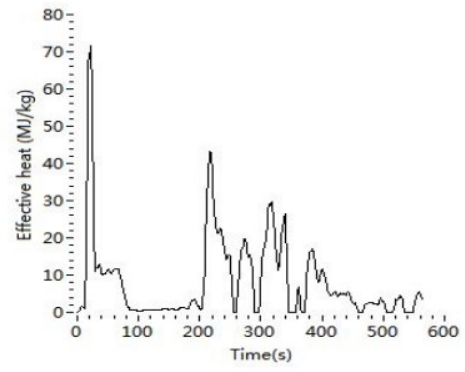
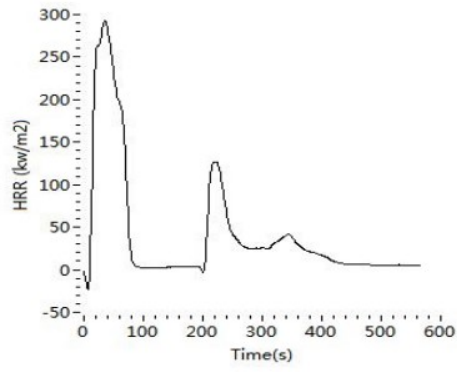
(S13) Analysis of EDS element content in cross section of EG<sub>0.05</sub>/PVC



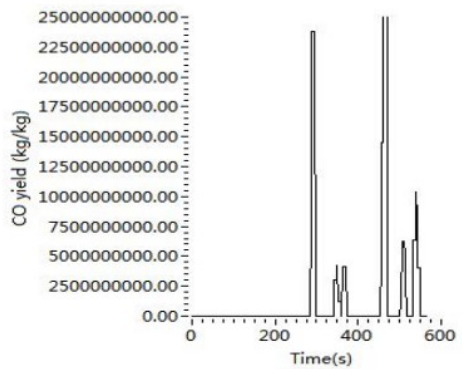
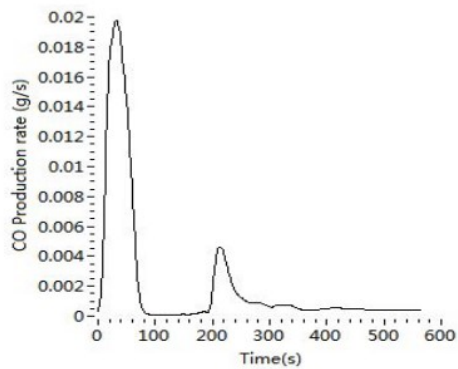
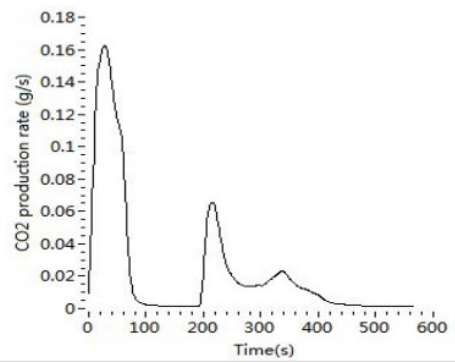
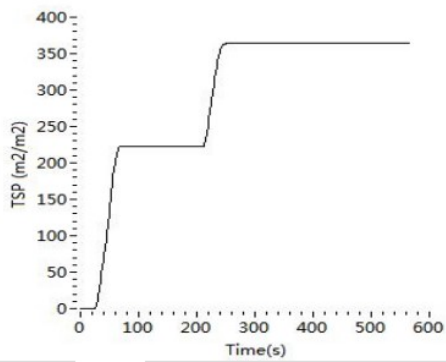
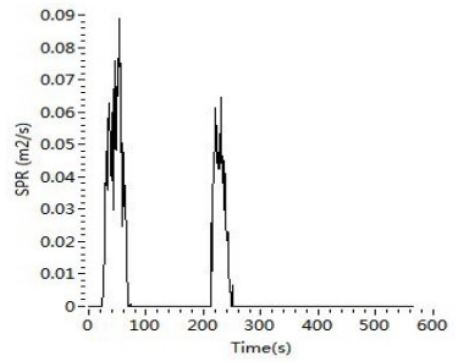
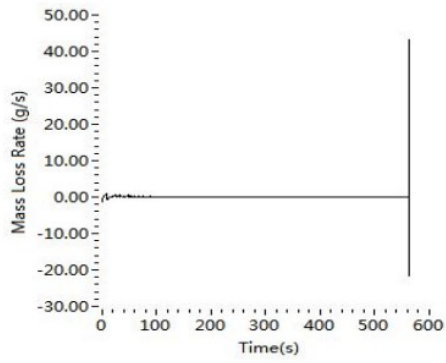
(S14) Analysis of EDS element content in cross section of A-EG<sub>0.05</sub>/PVC



(S15) Analysis of EDS element content in cross section of Si-MgO<sub>0.02</sub>-A-EG<sub>0.03</sub>/PVC



(S16) CCT test data of PVC



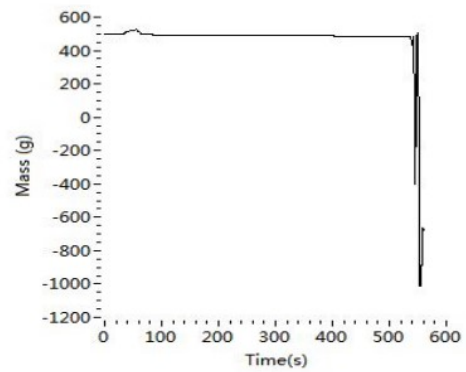
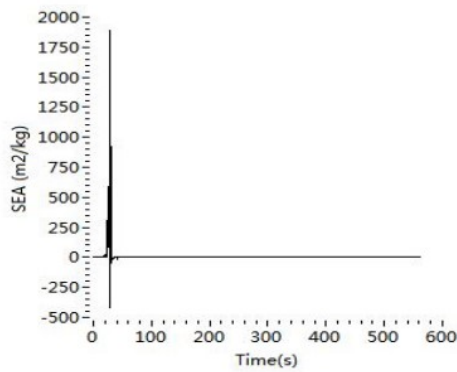
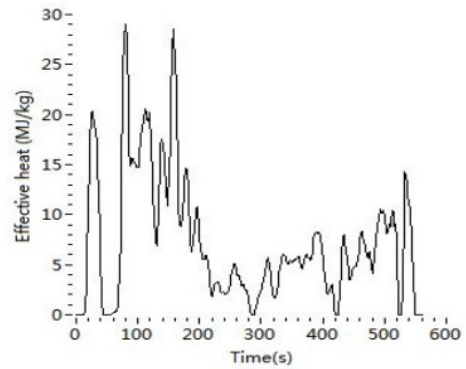
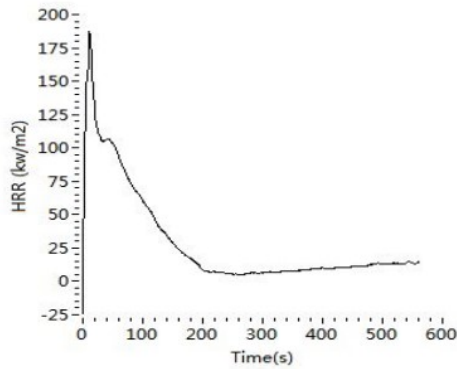
(S17) CCT test data of PVC

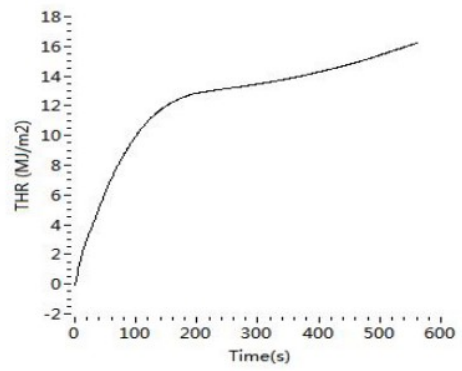
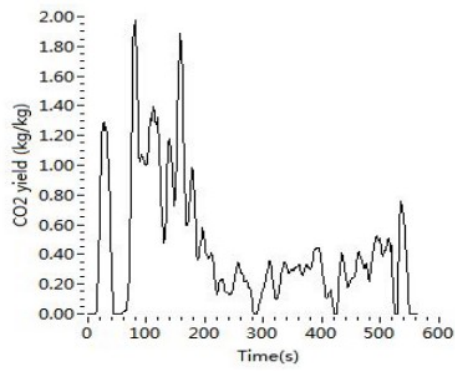
测试结果 (between 261 and 558s)		平均值	最大值	时间 (s)	
总热释放量	4.87 MJ/m <sup>2</sup>	热释放率 (kW/m <sup>2</sup> )	16.4941	42.4266	339
总耗氧量	3.29g	有效燃烧热 (MJ/kg)	13.8318	105.6511	290
质量损失	354.16g/m <sup>2</sup>	质量损失率 (g/(s·m <sup>2</sup> ))	1.1925	6.416	308
平均质量损失率 (mA, 10-90)	1.38g/(s·m <sup>2</sup> )	比消光面积 (m <sup>2</sup> /kg)	0	0	261
烟总释放量	0.00m <sup>2</sup> /m <sup>2</sup>	二氧化碳产量 (kg/kg)	0.0496	0.0881	277
总产烟量	0.00m <sup>2</sup>	一氧化碳产量 (kg/kg)	0.7831	2.2168	331
MARHE	208.73kW/m <sup>2</sup>				

测试数据	1 min	2 min	3 min	4 min	5 min	0s-261s	261s-558s
从试样点燃到结束...							
热释放率 (kW/m <sup>2</sup> )	26.4812	29.0511	23.542	19.1316	16.3759	72.2598	16.237
有效燃烧热 (MJ/kg)	14.2323	15.093	15.0791	14.3704	13.5764	7.1002	13.6163
质量损失率 (g/(s·m <sup>2</sup> ))	1.8606	1.9248	1.5612	1.3313	1.2062	10.1771	1.1925
比消光面积 (m <sup>2</sup> /kg)	0	0	0	0	0	137.2054	0
二氧化碳产量 (kg/kg)	0.0464	0.0378	0.0433	0.0471	0.0489	0.0445	0.0004
一氧化碳产量 (kg/kg)	0.9263	0.9477	0.9128	0.8418	0.7676	0.4622	0.0063

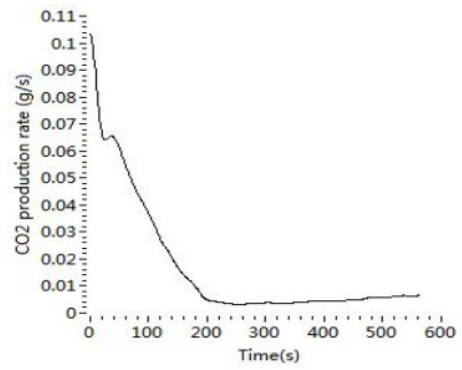
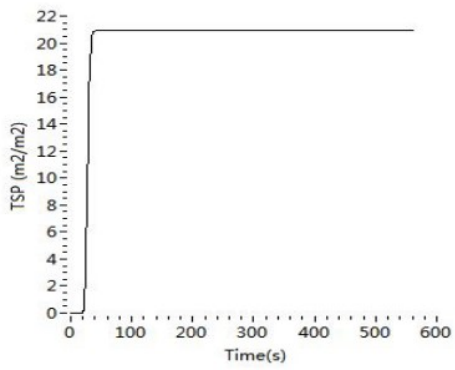
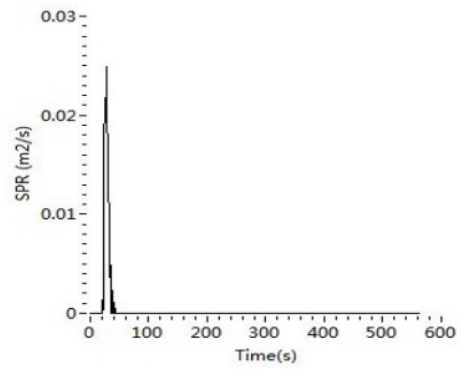
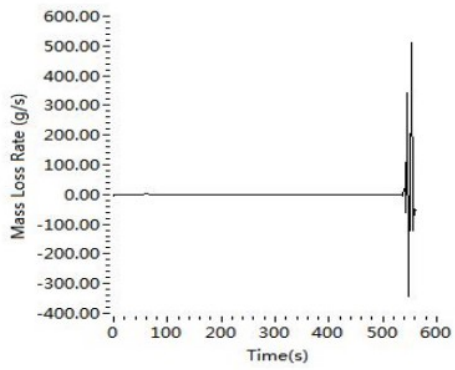
产烟结果	
烟总量: 无火焰阶段 (0s-261s)	364.4m <sup>2</sup> /m <sup>2</sup>
烟总量: 有火焰燃烧阶段 (261s-499s)	0.0m <sup>2</sup> /m <sup>2</sup>
烟总量: 整个测试阶段 (0s-558s)	364.4m <sup>2</sup> /m <sup>2</sup>

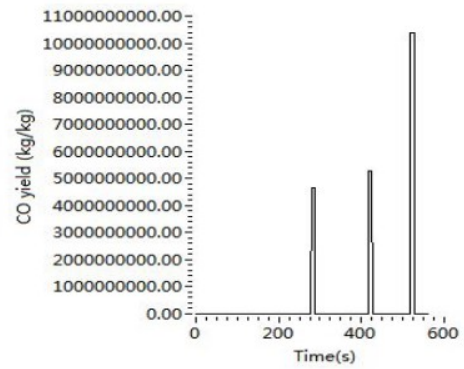
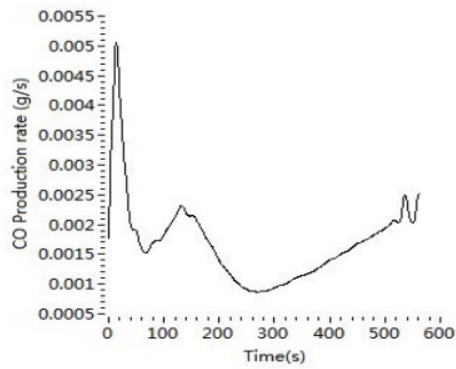
(S18) CCT test data of PVC





(S19) CCT test data of Si-MgO<sub>0.02</sub>-A-EG<sub>0.03</sub>/PVC





(S20) CCT test data of Si-MgO<sub>0.02</sub>-A-EG<sub>0.03</sub>/PVC

测试结果 (between 12 and 496s)

总热释放量	13.30MJ/m <sup>2</sup>
总耗氧量	8.97g
质量损失	1416.65g/m <sup>2</sup>
平均质量损失率 (mA, 10-90)	2.56g/(s·m <sup>2</sup> )
烟总释放量	20.96m <sup>2</sup> /m <sup>2</sup>
总产烟量	0.19m <sup>2</sup>
MARHE	168.75kw/m <sup>2</sup>

	平均值	最大值	时间(s)
热释放率 (kW/m <sup>2</sup> )	27.7516	145.1179	12
有效燃烧热 (MJ/kg)	9.4813	148.4633	279
质量损失率 (g/(s·m <sup>2</sup> ))	2.927	514.5638	64
比消光面积 (m <sup>2</sup> /kg)	14.7979	1884.9979	29
二氧化碳产量 (kg/kg)	0.0605	0.1912	12
一氧化碳产量 (kg/kg)	0.6146	2.7496	12

测试数据

从试样点燃到结束...	1 min	2 min	3 min	4 min	5 min	0s-12s	12s-496s
热释放率 (kW/m <sup>2</sup> )	102.058	79.1722	60.3039	46.9076	38.7531	159.6004	26.0567
有效燃烧热 (MJ/kg)	21.209	16.0257	14.0283	12.7148	11.797	-9.9501	8.9023
质量损失率 (g/(s·m <sup>2</sup> ))	4.812	4.9403	4.2987	3.6892	3.285	-16.04	2.927
比消光面积 (m <sup>2</sup> /kg)	72.6085	35.3613	27.0927	23.6767	21.272	0	0.3722
二氧化碳产量 (kg/kg)	0.0539	0.0487	0.0541	0.0558	0.0564	-0.0306	0.0018
一氧化碳产量 (kg/kg)	1.4073	1.0729	0.936	0.848	0.7865	-0.6146	0.0163

产烟结果

烟总量: 无火焰阶段 (0s-12s)	0.0m <sup>2</sup> /m <sup>2</sup>
烟总量: 有焰燃烧阶段 (12s-202s)	21.0m <sup>2</sup> /m <sup>2</sup>
烟总量: 整个测试阶段 (0s-496s)	21.0m <sup>2</sup> /m <sup>2</sup>

(S21) CCT test data of Si-MgO<sub>0.02</sub>-A-EG<sub>0.03</sub>/PVC