Electronic Supplementary Material (ESI) for Nanoscale Advances.

Supplementary Information

Flame-retardant MXene/Polyimide Film with Outstanding Thermal and Mechanical Properties Based on the Secondary Orientation Strategy

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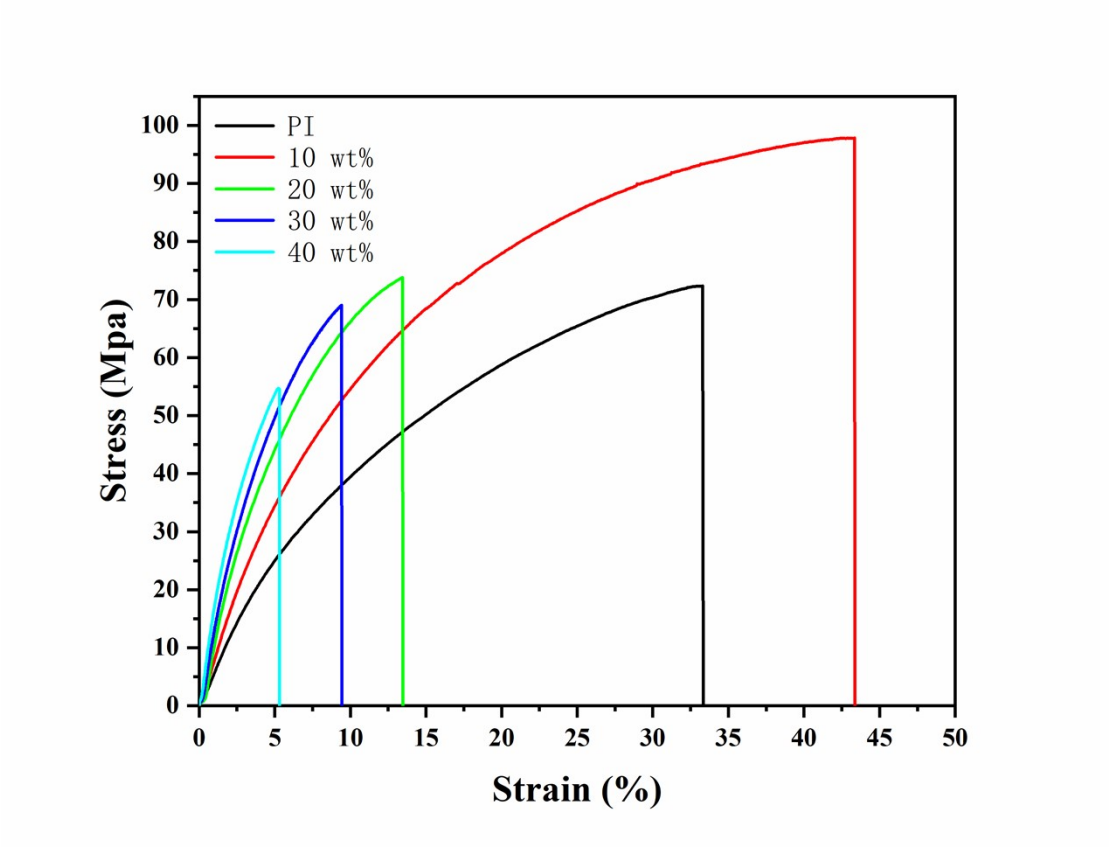

Fig. S1 Typical stress-strain curves of PI film and MXene/PI films.

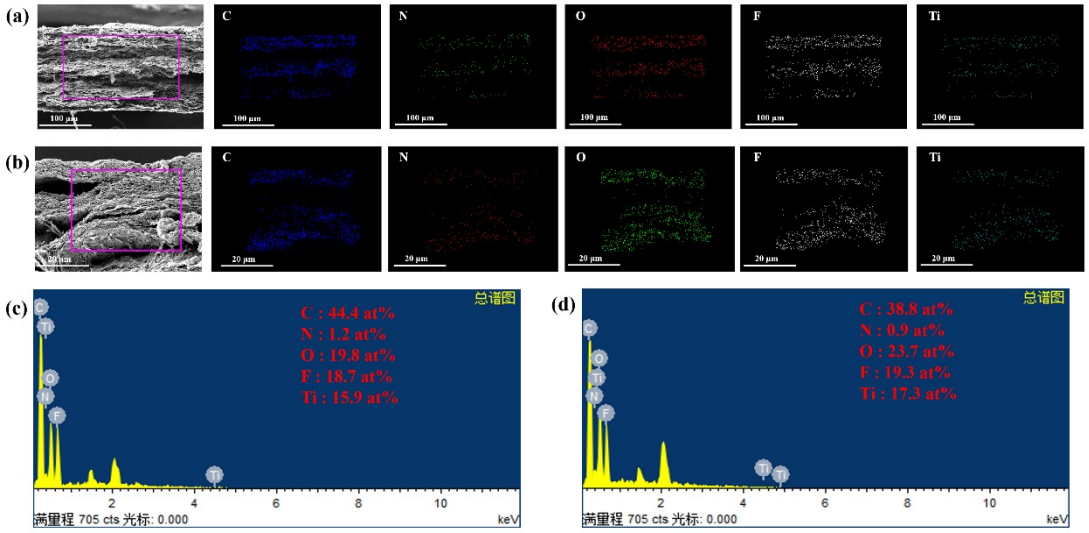

Fig. S2 SEM images of a) MXene/PI film, b) burned MXene/PI film and energy dispersive spectroscopy (EDS) mapping images of C, N, O, F, and Ti elements. EDS element spectrum and atomic percentage of c) MXene/PI and d) burned MXene/PI.

Table S1 Micro-scale Combustion Calorimeter (MCC) data of all samples.

Sample	HR Capacity (J/g-K)	Peak HRR (W/g)	Total HR (kJ/g)	Temperature (℃)
PI	75	47.6	0.9	556
MXene-10/PI	54	37	0.8	562.1
MXene-20/PI	28	22.7	0.8	563.1
MXene-30/PI	27	16.9	0.9	565.7
MXene-40/PI	26	12.8	0.7	572.7

Table S2 Comparison of properties of different PI composite materials.

Materials	Preparation method/condition	Thermal conductivity ($W\ m^{-1}\ k^{-1}$)	Tensile strength (MPa)	Literature
BN/PI film	Casting method	1.16	~69.6	1
AlN/BN/PI film	Casting method	0.711	~120.1	2
NH_2-rGO/PI film	Knife Coating method	7.13	35.7	3
CNF/hBN/PI film	Dip Coating method	0.627	~70	4
G/PI film	Knife Coating method	0.2275	~127.5	5
PI/GO/BN film	Casting method	11.203	—	6
rGO/PI film	Casting method	2.78	—	7
BN/PI film	Casting method	2.58	—	8
PI/CNNS film	Solution Casting method	2.04	—	9
Hyperbranched PI film	Knife Coating method	—	124.1	10
PI/FGS film	Casting method	—	~122	11

ZnS-MPTMS/PI film	Knife Coating method	—	~87.7	12
FG/PI film	Casting method	—	65.76	13
MXene/PI film	**Secondary Orientation Strategy**	**~5.12**	**~102**	**Our work**

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