

Supporting Information

Parameters Group No.	Variables		Fixed Parameters	
1	$C_{\text{gel}} = 10, 20, 50, 100, 200$ (mg/mL)		Sonication Time = 2 h	
			$C_i =$	Graphene: 50 mg/mL
				IGAs: 10 mg/mL
2	Sonication Time = 30, 60, 120, 360, 480 (min)		$C_{\text{gel}} = 50$ mg/mL	
			$C_i =$	Graphene: 50 mg/mL
				IGAs: 10 mg/mL
3	$C_i =$	Graphene: 10, 20, 30, 50, 100 (mg/mL)	$C_{\text{gel}} = 50$ mg/mL	
		IGAs: 10, 20, 30, 40, 50 (mg/mL)	Sonication Time = 2 h	

Table S1 The parameters used for the study on experimental condition of exfoliation of graphite, MoS₂, WS₂ and BN, where C_{gel} stands for the concentration of gelatin solution and C_i stands for the initial concentration of graphite, MoS₂, WS₂ and BN.

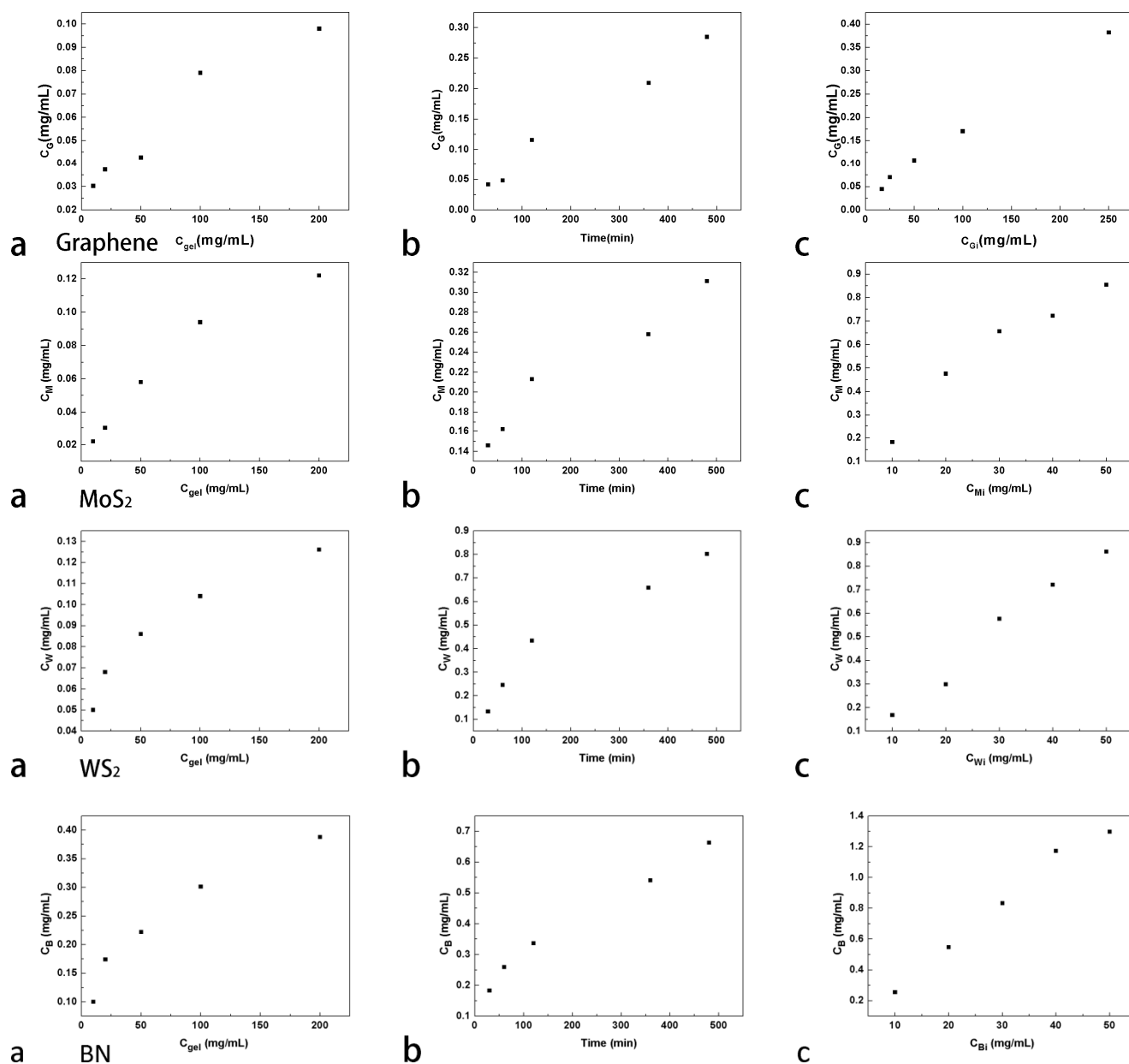


Fig. S1 Graphene and IGA concentration as a function of gelatin concentration, sonication time and initial graphite concentration, respectively. Fixed parameters: a) Concentration of initial materials (C_{Xi}) is 50 mg/mL for graphene and 10 mg/mL for IGAs, sonication time is 2 h. c) C_{Xi} is 50 mg/mL for graphene and 10 mg/mL for IGAs, concentration of gelatin (C_{gel}) is 50 mg/mL. d) C_{gel} is 50 mg/mL, sonication time is 2 h.

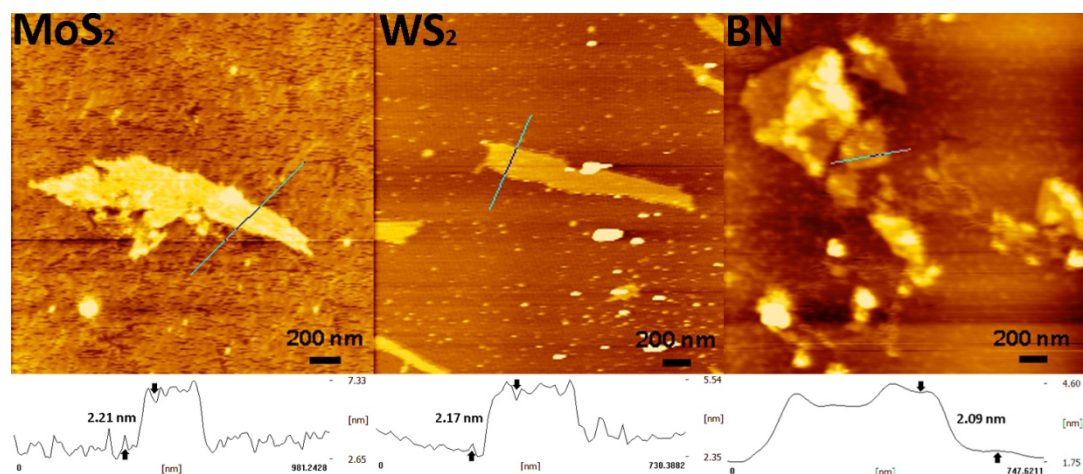


Fig. S2 Typical AFM images and height profiles of MoS₂, WS₂ and BN nanosheets.

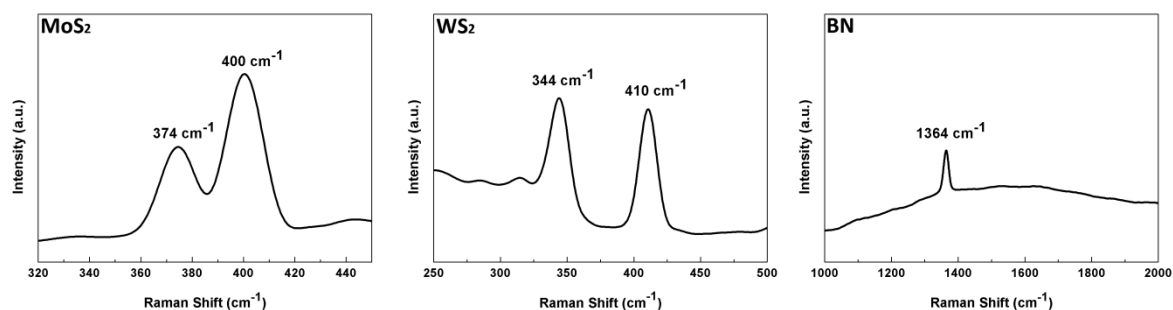


Fig. S3 Raman spectra of exfoliated MoS₂, WS₂ and BN

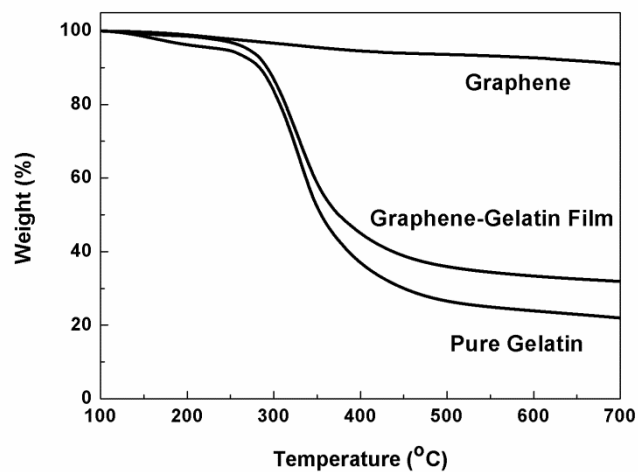


Fig. S4 TGA curves of pure gelatin, pure graphene and graphene/gelatin film prepared by filtration.

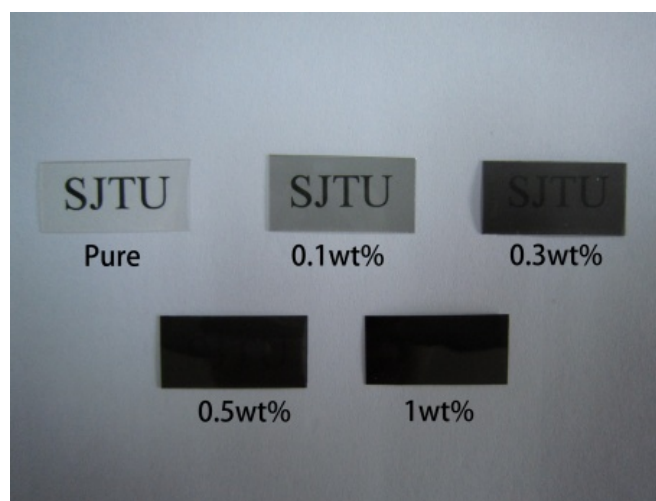


Fig. S5 Picture of gelatin/graphene composite films with different graphene content. The “SJTU” patterns beneath the films show the transparency of the films.

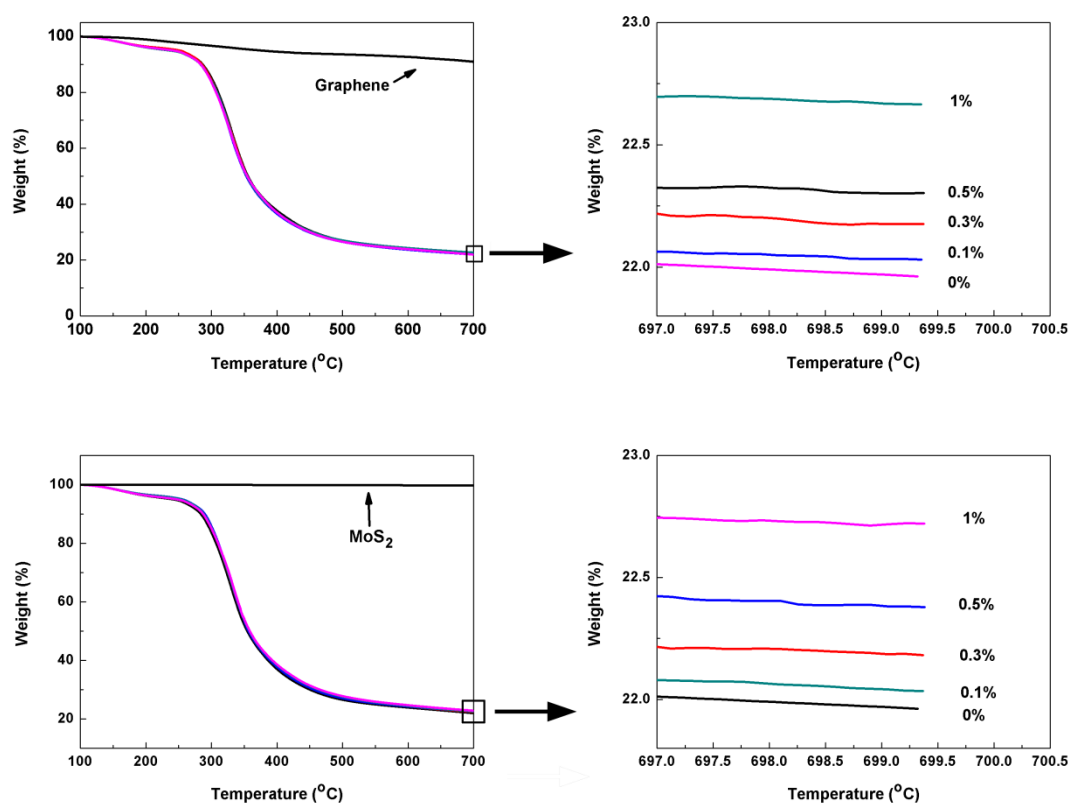


Fig. S6 TGA curves of pure graphene, MoS₂, and their corresponding gelatin-based composite films. The actual weight contents of graphene and MoS₂ were obtained by calculation. For gelatin/graphene films, the weight contents of graphene are 0.100%, 0.311%, 0.494% and 1.00%, respectively. And for gelatin/MoS₂ films, the weight contents of MoS₂ are 0.094%, 0.286%, 0.535% and 0.975%, respectively. These results are very close to the theoretical contents of fillers in composite films.

MoS ₂ content/wt%	Tensile strength/MPa	Elongation at break/%	Young's modulus/GPa
0	60.5±6.32	2.15±0.25	2.64±0.38
0.1	65.0±2.96	1.59±0.26	2.63±0.52
0.3	65.5±3.94	1.51±0.33	2.78±0.43
0.5	64.0±1.44	1.15±0.26	2.74±0.35
1	66.1±1.67	2.07±0.41	2.89±0.63

Table S2 Mechanical properties of gelatin/MoS₂ composites