Supporting Information

Enhanced Mechanical Toughness of Isotactic Polypropylene Using Bulk Molybdenum Disulfide

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Sample Geometry for Tensile Testing

The figure below shows the sample geometry used for the tensile testing. The tensile tests were carried out using an Instron 2519-107, USA universal Testing machine at a crosshead speed of 5 mm/min in displacement control mode at room temperature (19 °C).

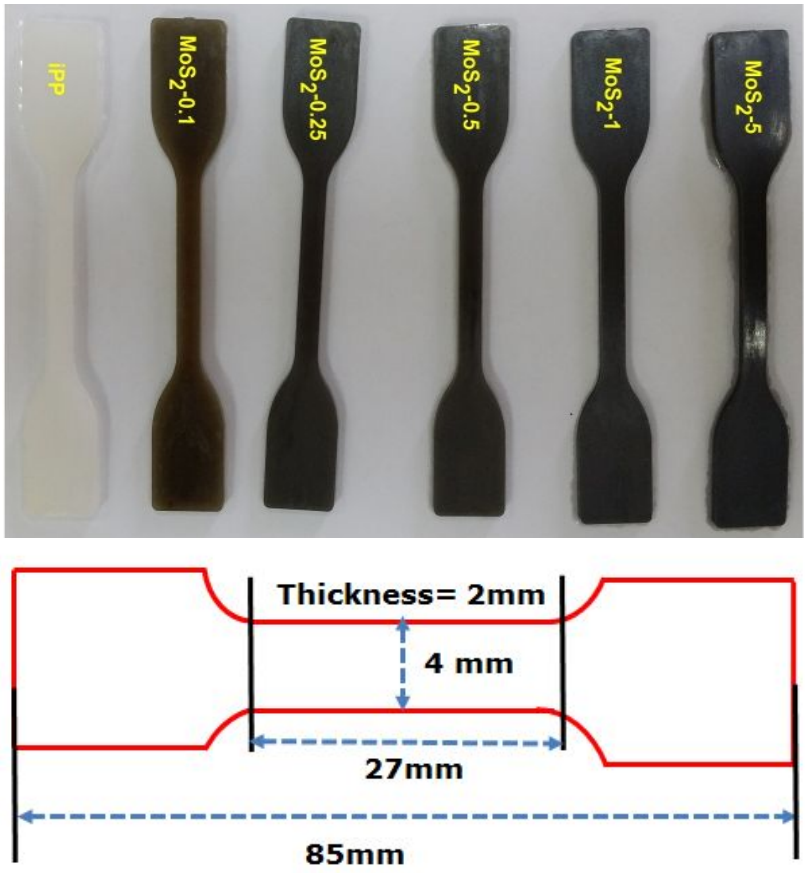

Figure S1. Digital image of iPP and iPP-MoS_2 nanocomposites before UTM study. The color of iPP-MoS_2 nanocomposites turned to black green with increase of MoS_2 content. The sample geometry used for the tensile testing.

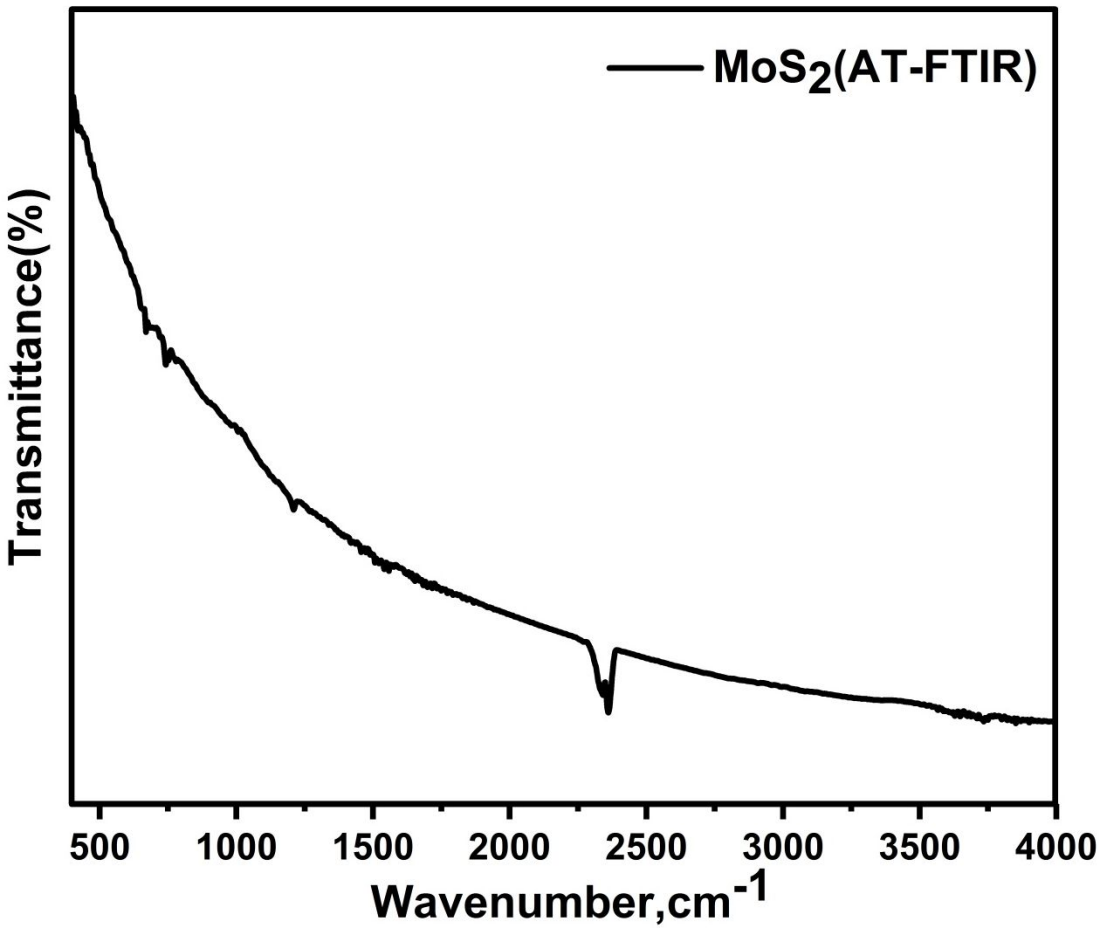

Figure S2.AT-FTIR spectra of bulk hexagonal MoS_2,

AT-FTIR measurement was conducted in the range of 400-4000 cm^{-1} to study the chemical compositions and bonds of the samples in the bulk MoS_2 .Results indicate that there is only one weak absorption peak at 474.1 cm^{-1} for the bulk MoS_2 powder, which can be ascribed to characteristic $(Mo\text{-}S)_{str}$ stretching vibration mode of MoS_2 . As can be seen in FTIR spectra, the bulk MoS_2 almost has no any characteristic absorption peaks due to the absence of functional groups on the surface of MoS_2 nano sheets.

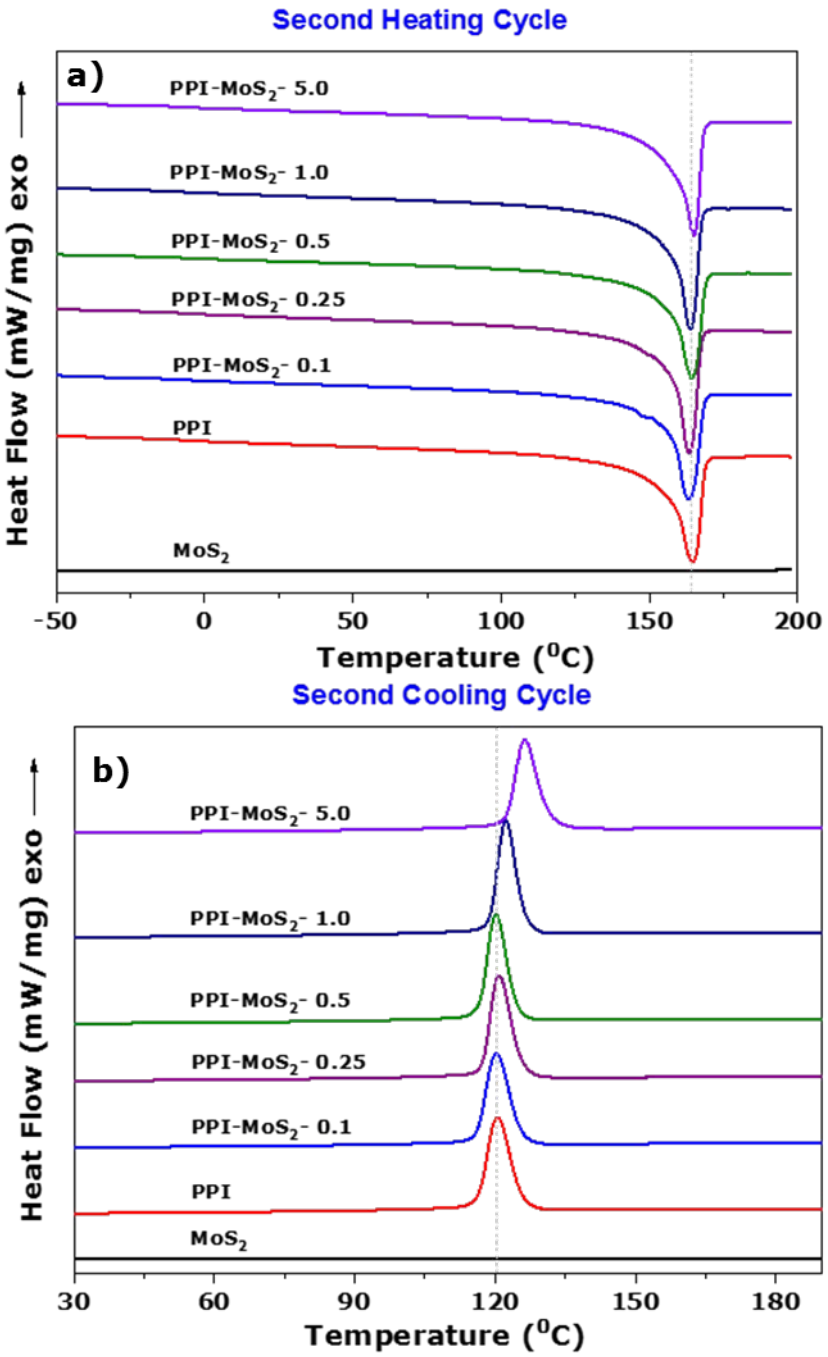

Figure S3. (a) Second heating and (b) cooling cycle DSC curves of MoS_2, iPP and iPP-MoS_2 hybrid composites

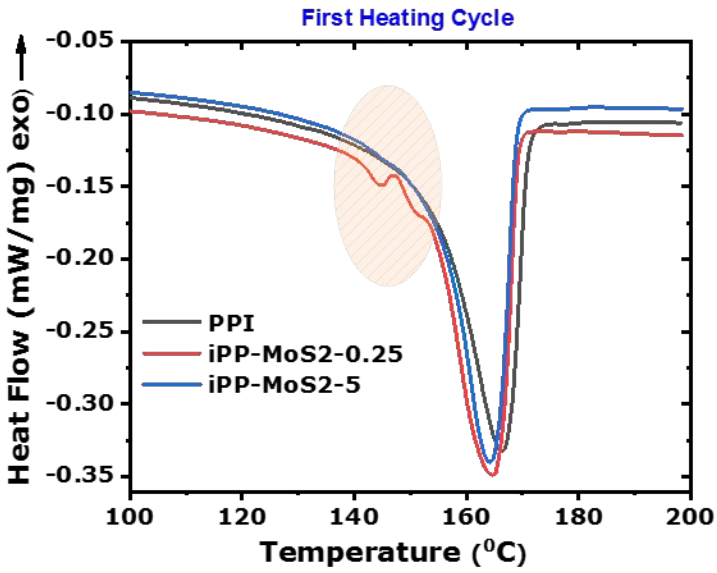

Figure S4. First Heating cycle of iPP, iPP-MoS2-0.25 and iPP-MoS2-5. In thermogram it can be clearly seen that the MoS2 at lower concentration shows the presence of beta cystal melting peak at around 145oC, whereas this peak is completely absent in pure iPP and iPP-MoS2-5 indicating the ability of the MoS2 to form beat crystals only at lower concentration

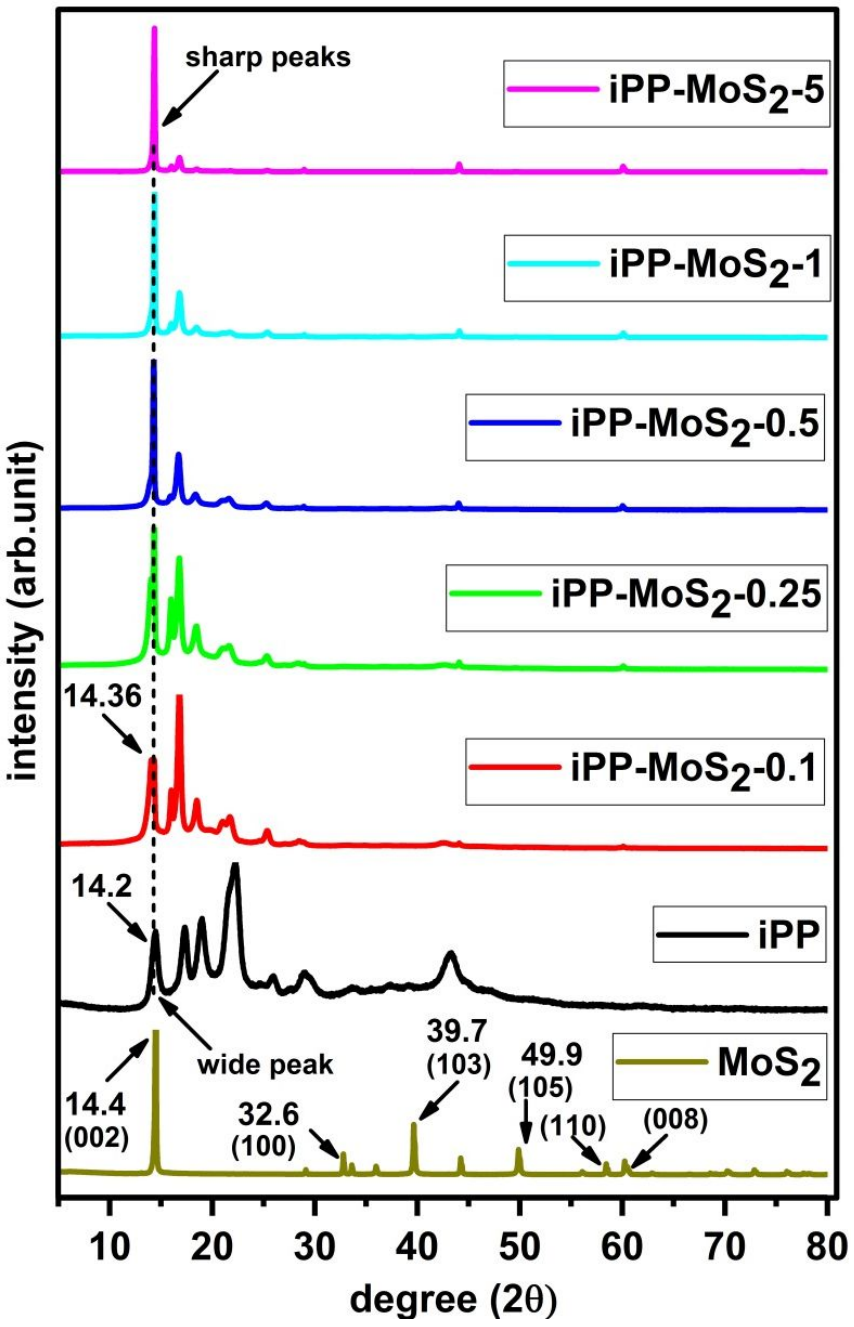

Figure S5. XRD patterns of bulk MoS_2, pure iPP and iPP-MoS_2 nanocomposites.

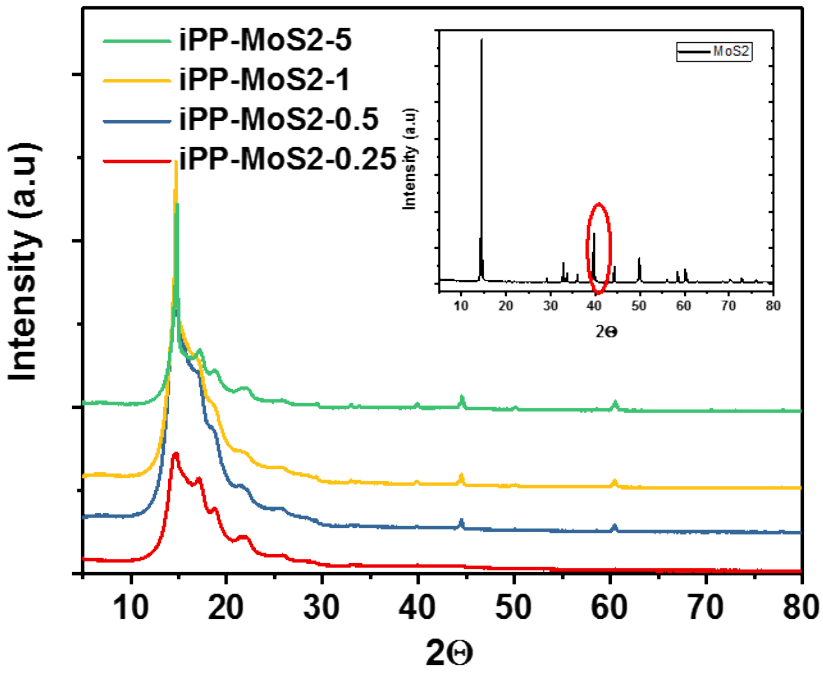

Figure S6. XRD patterns of stretched portion of iPP-MoS_2 nanocomposites after UTM test.

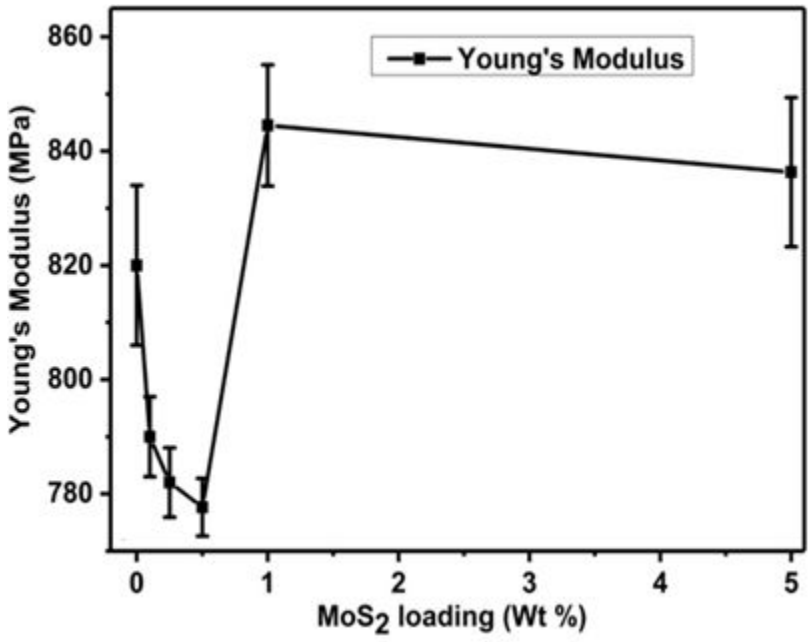

Figure S7. Effect of young's modulus at different loading percentage of MoS_2

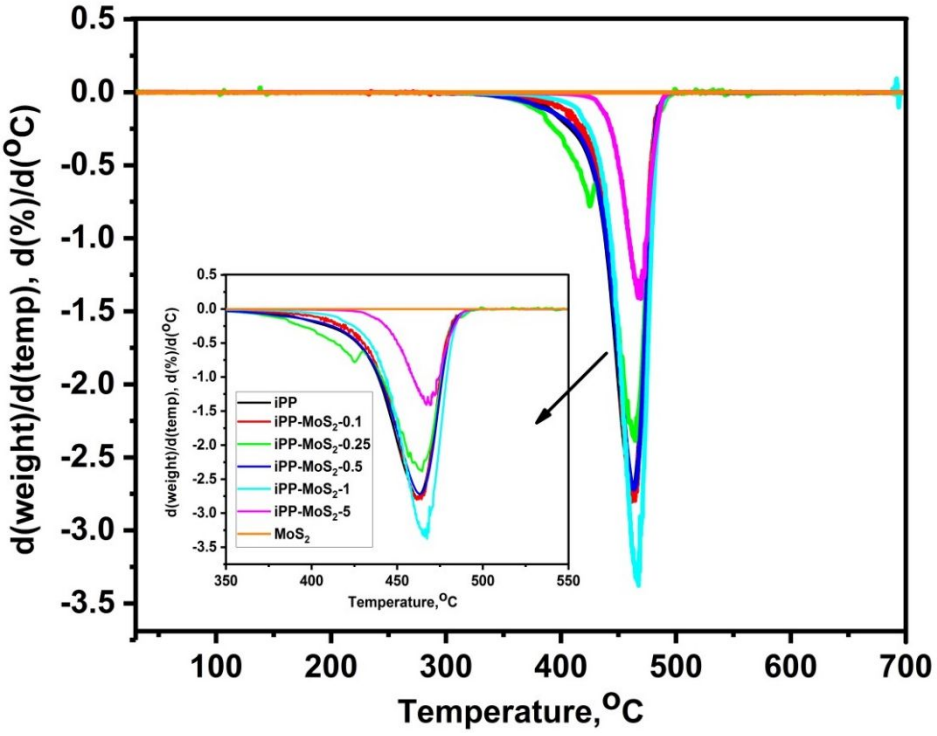

Figure S8. DTG curves of bulk MoS_2 and iPP-MoS_2-0.5 nanocomposites.

Tables

Table S1. Mechanical properties of iPP and iPP-MoS_2 nanocomposites.

Sample Name	ELONGATION (%)	MODULUS (MPa)	UTS (MPa)
iPP	152.7±22.0	843±14	34±0.6
iPP-MoS_2-0.1	620.0±30.0	790±7	33.1±0.7
iPP-MoS_2-0.25	791.3±67.4	782±6.08	32.6±0.63
iPP-MoS_2-0.5	683.3±52.6	777±5.03	32.2±0.16
iPP-MoS_2-1.0	552.7±48.2	844±10.6	35.6±0.19
iPP-MoS_2-5.0	41.0±4.2	836±13.0	37.6±0.48