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**Scale-up Production of Lightweight High-Strength Polystyrene/Carbonaceous Filler Composite Foams
with High-performance Electromagnetic Interference Shielding**

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Abstract: Conductive polymer composite (CPC) foams have been considered as a promising electromagnetic interference (EMI) shielding materials because of the advantages of the lightweight, low-cost and easy preparation process. However, most of the currently reported CPC foams were prepared by batch foaming process. Insight of large-scale and low-cost production of CPC foams, we presented a feasible extrusion foaming strategy of polystyrene (PS) composites with micro-graphite (mGr) or multi-wall carbon nanotube (MWCNT) using supercritical carbon dioxide (Sc-CO₂) as the physical blowing agent for EMI shielding application. The composite foams showed elongated cell morphology; meanwhile, the compressive strength and electrical conductivity were significantly increased. These composite foams presented a remarkable high performance of EMI shielding efficiency, corresponding average EMI SE of 22 dB and specific EMI SE of 92 dB/(g/cm³). In comparison between mGr and MWCNT, PS/mGr composite foam showed better EMI SE than that of PS/MWCNT composite foam at the same filler content due to the lower foam density of PS/mGr composite foam. Considering the feasible, large-scale and low-cost production process, these CPC foams are expected to apply in high performance EMI shielding areas.

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