# Hybrid nanocomposites based on poly (styrene-b-(ethylene-co-butylene)-b-styrene)/carbon nanotubes/graphene for electromagnetic shielding

Scheyla Kuester[1,2], Guilherme M. O. Barra[1], Nicole R. Demarquette[2#]

[1]*Universidade Federal de Santa Catarina - UFSC - Santa Catarina - Brazil*
[2]*École de Technologie Supérieure de Montréal - ETS - Quebec - Canada*
[#]Corresponding author: NicoleR.Demarquette@etsmtl.ca

**Abstract.** Hybrid nanocomposites based on poly (styrene-b-ethylene-ran-butylene-b-styrene) (SEBS), carbon nanotube (CNT), and graphene (GR) were prepared by melt compounding. Electromagnetic shielding effectiveness results indicate a synergism between the carbon nanoparticles.

Electromagnetic interference has become a serious problem for the last few years, mainly due to the extensive development of portable communication technologies. Thus, a growing demand for shielding materials is needed[1]. In these materials, the ability to attenuate the incident radiation is measured in terms of shielding effectiveness (SE), which represents the sum of the shielding mechanisms by Reflection ($SE_R$) and Absorption ($SE_A$)[1-3]. Table 1 summarizes the results of electrical conductivity, SE in dB, percentage of SE, and the SE by reflection and absorption mechanisms of the nanocomposites of SEBS/CNT prepared by melting compounding in the present work.

**TABLE 1.** Electrical conductivity and shielding values of neat SEBS and nanocomposites.

| Sample (CNT and/or GR wt%) | SE (dB) | SE (%) | $SE_R$ (%) | $SE_A$ (%) | Electrical conductivity ($S.cm^{-1}$) |
|---|---|---|---|---|---|
| SEBS | -0.65 | 13.82 | 11.24 | 2.58 | 1.2E-17 |
| SEBS/CNT 3 | -6.80 | 79.12 | 65.79 | 13.33 | 1.1E-01 |
| SEBS/CNT 5 | -10.47 | 91.02 | 68.36 | 22.66 | 9.4E-01 |
| SEBS/CNT 8 | -16.94 | 97.98 | 60.27 | 37.71 | 1.4E+00 |
| SEBS/CNT 10 | -20.71 | 99.15 | 72.83 | 26.32 | 1.8E+00 |
| SEBS/CNT 15 | -29.60 | 99.89 | 76.89 | 23.00 | 2.2E+00 |
| SEBS/GR 15 | -7.95 | 83.98 | 79.75 | 4.23 | 2.6E-07 |
| SEBS/CNT 5 /GR 5 | -12.72 | 94.65 | 59.40 | 35.26 | 8.4E-01 |
| SEBS/CNT 8 /GR 2 | -23.37 | 99.54 | 71.43 | 28.11 | 1.4E+00 |

It can be seen from Table 1 that the addition of both 8wt% of CNT and 2wt% of GR to SEBS resulted in a synergetic effect regarding the EMI shielding effectiveness when compared to the addition of CNT solely. However, the same was not observed for the electrical conductivity. At last, the nanocomposites prepared really have a good potential application, once the industry requirement for shielding materials is a SE higher than -20 dB (< 99 %)[3].

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