

Description for the general public

The project is focused on the development of novel compatibilizers for polymer blends that would bring novel practical properties to polymer materials. The compatibilizers will be based on specifically arranged graphitic particles in polymer blends. The specific surface chemistry based on polymer brushes will enable to localize particles in individual polymers and/or at the interphase, and thus easily and effectively tune the material performance.

The public should care about the polymer blends from several reasons. Any polymer product that is available is made of blends. At least small percentage of recycled material is involved. The polymer blends are composed to gain material properties that would not be achievable at neat homopolymers. However, some polymer blends in term of ratio of polymers are not possible to prepare due to high immiscibility. The phases separate that result namely in pure mechanical properties, and loss of transparency.

The compatibilizers have to be used to stabilize the materials. They could be based on block copolymers, gamma radiation, or reactive polymers. However, in the production, often no such materials are added due to high additional cost of the procedure. As a consequence, the polymer resources remain not fully utilized.

The employment of nanofiller would be advantageous from several reasons. The particles grafted with polymer brushes can be easily located at the interphase, where it affects the compatibility of the blend, improve the mechanical properties. The well dispersed nanoparticles in polymer matrix will retain the clarity of the material at low loading, and in case of electrically conductive filler, another very important material property could be gained. The graphene is a nanofiller, it has large surface area, is electrically conductive in reduced form, and with grafted surface it is the best candidate to fulfil these goals at extremely low filler loading.