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**Functional textiles based on polyurethane nanocomposite coatings**

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Thermoplastic polyurethane (TPU) is a versatile polymer having excellent flexibility and elastic recovery, excellent adhesion property, good abrasion resistance, good chemical resistance and heat sealability and therefore finds extensive applications in coatings. With the growing demand of different functionality in coated textiles for technical applications, polymer nanocomposite coatings is being looked as an attractive option. Incorporation of nano materials in the polymer coating formulations can enhance several properties such as gas barrier, antimicrobial, self-cleaning, microwave absorbency, wear and tear resistance or weather resistance. This paper discusses the potential of polymer nanocomposites as an emerging new material for coatings on different substrate media such as textile fabrics. The highlights of some of the work we have undertaken at IIT Delhi over past few years in this area would be highlighted. An initiative has been taken by our group to improve the weather resistance and gas barrier property of TPU coatings by incorporating nanoclay and functionalized graphene in polyurethane matrix. One of the applications for TPU coated textile fabric is inflatables such as parachute, hot air balloon and aerostats. Needless to say, these inflatables require very good mechanical properties such as tensile strength, modulus, bursting strength, abrasion resistance as well as good thermal stability. Conventionally polyurethane coated nylon or polyester fabrics are being used for these inflatable structures. The retention of helium/hydrogen and weather resistance properties are most crucial for this product as far as durability and service life is concerned. Apart from significantly enhancing various attributes of the base fabric, the presence of nanoclay markedly reduces the permeability to gases such as nitrogen and helium for both solution and melt coated sample. Also, as gas permeability and weather resistance go hand-in-hand, it was encouraging to observe that PU/nanoclay nanocomposite coated fabrics had improved weather resistance as compared to the neat PU coated samples. This is evident from reduced loss in strength and helium permeability on exposure of coated samples to outdoor weathering conditions.