

## Water-borne polymer/reduced graphene oxide adhesives

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The main objective of the present work is synthesis of water borne adhesives reinforced with reduced graphene oxide (rGO) platelets. For preparation of these composites the technique of emulsion mixing of water borne polymer dispersions (latexes) with stable rGO aqueous dispersions was used.

The water borne latexes composed of poly (butyl acrylate/methyl methacrylate) (pBA/MMA) with adhesive formulation and with 40% solid content were synthesized by semicontinuous seeded emulsion polymerization using 4,4 azobis cyanopentanoic acid or potassium persulphate as initiators and sodium lauryl sulphate or Dowfax as emulsifiers. After thorough characterization of polymer microstructure they were mixed with stable rGO aqueous dispersions, obtained by hydrazine reduction of GO in presence of polyvinyl pyrrolidone or polyacrylic acid. The composite films were prepared from hybrid latexes, by water evaporation at standard atmospheric conditions.

The composite films formed have shown a lot of irregularities and presence of bubbles. The possible cause was found to be the presence of ammonium salts, formed during the reduction process. Thus, before mixing, the rGO dispersions were dialyzed in order to remove them. The hybrid latexes formed from dialyzed rGO dispersions have shown to be stable without any precipitation or phase separation. The content of rGO was varied and the mechanical properties and electrical conductivity of these composite adhesives were determined.