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Atmospheric Plasma surface treatment of Styrene-Butadiene Rubber

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Thermoplastic rubbers are widely used in a large number of applications (e.g. footwear, adhesives manufacturing, moulded or extruded goods). Due to the non-polar nature of these rubbers, poor adhesion is achieved with polar polyurethane (PU) adhesive thus, a surface treatment is required to chemically modify the rubber surface and produce suitable joints. Surface treatments have been demonstrated to be suitable for the improvement of adhesion and wettability properties of non-polar synthetic rubbers. Over the last two decades progresses in adhesion of rubber were achieved by changing of the ingredients in rubber composition or by modifying surfaces by the use of a chemical agent (halogenation, cyclization, etc.) or using high energy irradiation such as bombarding the surface by electron beam or gamma irradiation. Plasma surface treatment has been successfully used to modify the surface of different polymers, such as polypropylene, PET and styrene-butadiene rubbers (SBR). In this study, the atmospheric pressure treatment of several SBR rubbers by means of a plasma torch system is reported. The effect of experimental variables such as distance, velocity and scan number on the adhesion of PU adhesive was evaluated and compared with halogenated SBR rubbers. After optimization of the experimental parameters the aging of the plasma treated surfaces was studied for a long period in order to monitor the effectiveness of the plasma treatment.

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