

Preparation of Superhydrophilic Magneto-active Elastomers through Oxygen Plasma Treatment

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Magneto-active Elastomers (MAEs) are a class of smart composites exhibiting remarkable magnetically tunable mechanical properties with applications in soft robotics, biomedical devices, sensing systems, and lately controlled surface properties (1), particularly wettability (2–3). In this study, superhydrophilic surfaces on MAEs were fabricated through oxygen plasma treatment. The influence of key processing parameters, including oxygen flow rates, magnetic field during treatment, and post-treatment storage conditions, was systematically investigated over 5 weeks. It is important to note that all samples directly after plasma treatment had a superhydrophilic character; however, the samples that were stored in air conditions soon recovered their hydrophobic nature. The findings offer practical guidelines for optimizing plasma treatment protocols in MAE applications where stable and controlled surface wettability is essential.

Keywords: Superhydrophilic surface; Magneto-active elastomer; Oxygen plasma treatment; Surface wettability.

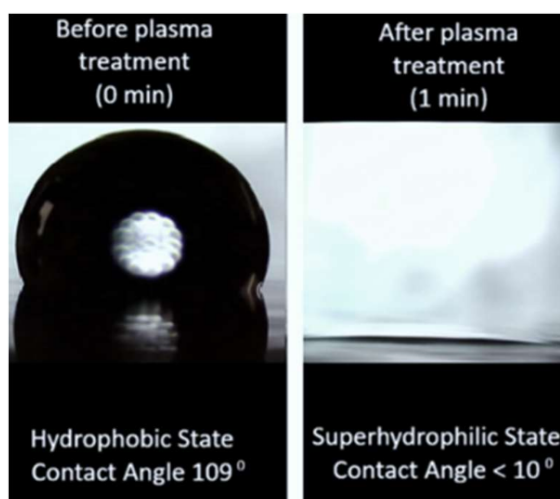


Figure 6: On the left is the MAE before plasma treatment; on the right is the MAE immediately after plasma treatment.

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