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Abstract

In this paper, a linear shape nanosecond pulsed dielectric barrier discharge is generated at atmospheric pressure for improving the hydrophilic property of aramid fibers. The discharge images, waveforms of voltage and current, and optical emission spectra of discharge are obtained to investigate plasma characteristics, and the water contact angles, scanning electron microscopy, and X-ray photoelectron spectroscopy are employed to estimate the modifying effects of plasma and investigate modification mechanisms. It is found that 75 s is an optimal treatment time in air under 2 mm discharge gap, 28 kV pulse peak voltage, and 100 Hz pulse repetition rate, and the energy density of discharge is about 2.1 J/cm^2. The improvement of aramid fiber hydrophilicity is due to the increasing of surface roughness and the formation of