Improved polymer hydrophilicity is beneficial for cell culturing and implant growth.

**Use of Atomic Oxygen for Increased Water Contact Angles of Various Polymers for Biomedical Applications**

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The purpose of this study was to determine the effect of atomic oxygen (AO) exposure on the hydrophilicity of nine different polymers for biomedical applications. Atomic oxygen treatment can alter the chemistry and morphology of polymer surfaces, which may increase the adhesion and spreading of cells on Petri dishes and enhance implant growth. Therefore, nine different polymers were exposed to atomic oxygen and water-contact angle, or hydrophilicity, was measured after exposure. To determine whether hydrophilicity remains static after initial atomic oxygen exposure, or changes with higher fluence exposures, the contact angles between the polymer and water droplet placed on the polymer’s surface were measured versus AO fluence. The polymers were exposed to atomic oxygen in a 100-W, 13.56-MHz radio frequency (RF) plasma asher, and the treatment was found to significantly alter the hydrophilicity of non-fluorinated polymers.

Pristine samples were compared with samples that had been exposed to AO at various fluence levels. Minimum and maximum fluences for the ashing trials were set based on the effective AO erosion of a Kapton witness coupon in the asher. The time intervals for ashing were determined by finding the logarithmic values of the minimum and maximum fluences. The difference of these two values was divided by the desired number of intervals (ideally 10). The initial desired fluence was then multiplied by this result (2.37), as was each subsequent desired fluence. The flux in the asher was determined to be approximately $3.0 \times 10^{15}$ atoms/cm$^2$ sec, and each polymer was exposed to a maximum fluence of $5.16 \times 10^{20}$ atoms/cm$^2$.

It was determined that after the shortest atomic oxygen exposure (fluence of $2.07 \times 10^{18}$ atoms/cm$^2$), non-