STUDY OF THE FRICTION COEFFICIENT OF POLY(ε-CAPROLACTONE) FILMS AFTER THE PLASMA TREATMENT

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Poly(ε-caprolactone) is a biocompatible and bioresorbable synthetic polymer that has been extensively studied and applied in implants for ophthalmic controlled drug delivery. The implanted material must withstand the mechanical effects of surgical instruments, and therefore it is useful to know about the tribological characteristics of the polymer implants.

The purpose of this work is to study the coefficient of friction of poly(ε-caprolactone) films after the exposure to low-temperature atmospheric plasma.

Initial film samples of poly(ε-caprolactone) were obtained from a 1 % solution of poly(ε-caprolactone) with a molecular weight of Mw = 80,000 g/mol (Sigma-Aldrich, England). The each side of material was treated with low-temperature atmospheric pressure plasma (the treatment time was 30 s). Friction and wear studies were carried out using the finger-disk scheme under dry sliding friction conditions on a TRIBO technik machine (France) while varying the test duration (0,13–0,5 m) and sliding speed (in the range (1.5–5) mm/s). A counterbody was a ceramic ball (diameter = 6 mm).

The range of the coefficient of friction of initial films was 0.127–0.394 (1.5 mm/s), 0.124–0.329 (3 mm/s), 0.126–0.37 (5 mm/s). The range of the coefficient of friction of films after the plasma treatment was 0.125–0.244 (1.5 mm/s), 0.125–0.491 (3 mm/s), 0.125–0.399 (5 mm/s).

An increase in the speed and duration of the sliding test did not change of the friction coefficient of the initial samples and films after exposure to the plasma.