

DBD-PLASMA SOURCE FOR POLIMER TREATMENT

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DBD-plasma with pulse power supply was used for improving hydrophilic properties of polytetrafluoroethylene (PTFE).

DBD-plasma source with pulse power supply was designed. High-voltage pulses with 20-ns fall time and 12-us rise time, regulated amplitude 0-20 kV and frequency 1-3 kHz were formed at electrodes by the home-made pulse semiconductor generator [1]. The discharge was realized in 1-mm atmospheric air gap between two ring metal electrodes with diameter of 30 mm [2]. The upper high-voltage electrode was covered by 1-mm-barrier plate with $\epsilon = 4$. 50x50x1-mm plate of PTFE served as a sample, which was put on the lower grounded electrode during the experiment.

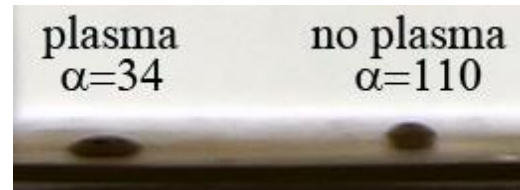


Figure 1. Photo of the water drop on the PTFE surface before and immediately after DBD-plasma treatment

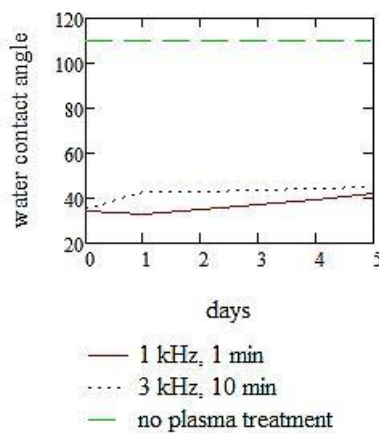


Figure 2. Water contact angle versus days after plasma treatment

Plasma treatment of PTFE-surface was conducted (fig.1). The test was carried out in two regimes: 1) voltage – 20 kV, frequency – 1 kHz, treatment time – 1 minute; 2) voltage amplitude – 20 kV, frequency – 3 kHz, treatment time – 10 minutes. It's worth to note that the water contact angle was the same for two regimes immediately after the treatment ~ 34°, but the samples ageing occurred in a different way (fig.2). The samples treated in regime 1) retained their hydrophilic properties after DBD-plasma treatment longer.

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REFERENCES

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2. Khomich, V. Y., Malashin, M. V., Moshkunov, S. I., Shershunova, E. A., Yamschikov, V. A. (2014). *IEEE Transactions on Plasma Science*, 42, 3314.