Electromechanial Characteristics of Actuators Based on Carbide-derived Carbon

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# Abstract

An electromechanical transducer was prepared using non-ionic polymer, ionic liquid and carbide-derived carbon (CDC). Recently simple layer-by-layer casting method was discovered for actuator production using „bucky gel“ mixture as a precursor of actuator electrode layers. In this paper we investigate carbide-derived carbon as new alternative candidate to carbon nanotubes to replace nanotubes in electrode layer of transducer. At the initial stage of the study, the ratio of nanoporous high surface TiC-derived carbon powder, 1-ethyl-3-methylimidazolium tetrafluoroborate (EMIBF4) and polymer (PVdF(HFP)) was varied and each formed electrode was analyzed to find out an optimal composition. The results revealed that the optimal component ratio for electrodes is: 35 wt% PVdF(HFP), 35 wt% EMIBF4 and 30 wt% CDC. The assembled three layer transducers were characterized by measuring blocking force, maximum strain, speed and their power consumption and capacitance. The synthesized actuator showed very good force and capacitive characteristics and it is preferable for slow response applications compared to transducers based on carbon nanotubes.