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Fabrication of transparent protective DLC films on polymer materials SANGMIN BAEK, TATSURU SHIRAFUJI, Department of Materials, Physics and Energy Engineering, Nagoya University, NAGAHIRO SAITO, OSAMU TAKAI, EcoTopia Science Research Institute, Nagoya University, SEONGHWAN LEE, HEON LEE, Department of Materials Science and Engineering, Korea University — In this work, a-C:H and Si doped a-C:H films were prepared by a pulse biased inductively coupled plasma chemical vapor deposition system using a C_2H_2 gas and a C_2H_2+$Si(CH_3)_4$ gas mixture, respectively. The effects of Si incorporation on the optical and mechanical properties of the films were investigated. The optical band gap of the films was improved by Si incorporation in them. Structural characterization through Raman analyses showed that the addition Si in the films leads to the increase of sp^3 fraction. The hardness of the Si-doped films slightly decreased in comparison to that of non-doped films (from 12.09 to 11.77 GPa). The critical load related to adhesion strength increased from 13.33 to 15.88 mN. The reduction of residual stress with Si-doping is considered to result in the decrease of the hardness and the increase of adhesion strength.

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