

Swift heavy ion tracks in polycarbonate for etching templates

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It is known that swift heavy ion irradiation of polycarbonate results in latent tracks. These ion tracks can be selectively etched with sodium hydroxide, yielding a structure of fine holes with a diameter of about 50 nm. This arrangement can be used for tracking of ions or as an etching template for fabrication of self-aligned structures using ion irradiation. Therefore, the combination of tetrahedral amorphous carbon (ta-C) and polycarbonate, due to their behavior under swift heavy ion irradiation, is examined. After swift heavy ion irradiation, here 1 GeV U-ions, insulating ta-C is transformed into a graphite-like, conductive nanowire along the ion track. Spin coating polycarbonate on top of ta-C before irradiation, the breaking of polymer chains allows a selective etching, the ion track can be located. The holes in polycarbonate can be filled to apply an electrical contact, and thus a single ion track may be contacted. Otherwise, different layers can be deposited on top of ta-C before spin coating polycarbonate. These layers do not show such a transformation after irradiation, the etched holes form a mask which allows removing the layers beneath to use the nanowire in ta-C for field emitting purposes. Here, we present the procedure of polycarbonate coating (film thickness ~ 600 nm) on ta-C-samples and etching of latent ion tracks.