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Black diamond produced by N ion implantation

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We studied on the coloration of gemstones by implantation. 70keV nitrogen ions were implanted into the transparent and yellowish diamonds, followed by heat treatment at 600°C for 2 hrs. Color of the implanted diamonds appeared black regardless of the prior color. Post irradiation heat treatments of the N implanted black diamonds in inert/vacuum atmospheres produced more vivid black color, while the changed color disappeared after heat-treating in air. XPS analysis showed that nitrogen was detected in the black diamond, whereas no nitrogen was detected in the color disappeared diamond. Weight reduction took place in the heat-treated diamond as functions of the heat-treating temperature and time. However, the weight reduction is not the only factor of the color disappearance, because black color was more vivid although the weight loss of the irradiated diamond observed after annealing in vacuum.