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Discharge characteristics of micro-needle array diamond structure TAKAYUKI MISU, Department of Home Electronics Engineering Kanagawa Institute of Technology, 1030 Shimo-Ogino, Atsugi 243-0292, Japan, SHIMON ONO, TSUKASA HIGA, MIKI GOTO, TOSHIHIKO ARAI, Department of Electrical and Electronic Engineering Kanagawa Institute of Technology, 1030 Shimo-Ogino, Atsugi 243-0292, Japan — Using the back-sputtering techniques, we examined to create micro-needle array of high aspect ratios on diamond substrate surfaces, and measured the discharge characteristics of the diamond electrodes. The roughness of diamond substrate surfaces was formed using O_2 gas plasma in a reactive ion etching (RIE) system. The power electrode materials of RIE were used both stainless steel and MgO sintered ceramic. The samples of diamond to be etched were positioned on the power electrode. The values of the secondary electron emission coefficient γ were obtained by introducing the breakdown voltages measured into the self-sustained equation. The micro-needle array of high aspect on diamond substrate surfaces was fabricated by using back-sputtering from MgO electrode. The RMS roughness of diamond substrate surfaces in the case of MgO electrode is higher than those in the case of stainless steel electrode. The γ value in the case of MgO electrode is about two times higher than those in the case of stainless steel electrode.

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