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Low-energy Plasma Ion Implantation NORIYUKI SAKUDO, NORIAKI IKENAGA, KEI MATSUI, Kanazawa Institutte of Technology — We formerly showed that deposited film of NiTi can be crystallized at very low substrate temperature without any post-annealing treatment by using simultaneous ion irradiation with sputter deposition. Since the ion energy for optimum crystallization was around 80 eV which was very low compared with usual plasma ion implantation, the ion acceleration voltage was determined by the potential difference between the pulse bias voltage which was negative and the plasma potential which was positive with respect to the grounded chamber. In this study we find that the plasma potential itself changes as functions of the bias voltage as well as the configuration factor, i.e., the area ratio of the bias electrode surface to the chamber wall surface. In order to get the exact ion energy we obtain a new formula for plasma potential by deducing from the equation for continuity of charged-particle currents in plasma. Resultantly, it is shown that the plasma potential differs from that obtained by the conventional simple plasma model, especially when the electron temperature and/or the configuration factor become higher. In some cases the bias voltage might be positive in order to keep the ion energy as low as around 80 eV.

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