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Formation of hydrogenated amorphous carbon films by reactive high power impulse magnetron sputtering containing C_2H_2 gas[1] TAKASHI KIMURA, HIKARU KAMATA, Nagoya Institute of Technology — Diamond-like carbon (DLC) films have attracted interest for material industries, because they have unique properties. Hydrogenated amorphous carbon films are prepared by reactive high power impulse magnetron sputtering (HiPIMS) containing C_2H_2 gas and the properties of the films produced in Ar/C_2H_2 and Ne/C_2H_2 HiPIMS are compared. Production of hydrocarbon radicals and their ions strongly depends on both electron temperature and electron density in HiPIMS. Therefore, the influence of the difference in buffer gas (Ar and Ne) on the film properties is also valuable to investigate. The film preparation is performed at an average power of 60 W and a repetition frequency of 110 Hz. Total pressure ranges between 0.3 and 2 Pa. The maximum of instantaneous power is about 20-25 kW, and the magnitude of the current is 35 A. A negative pulse voltage is applied to the substrates for about 15 μs after the target voltage changed from about -500 V to 0 V. Hardness of the films prepared by Ar/C_2H_2 HiPIMS monotonically decreases with increasing the total pressure, whereas that of the films prepared by Ne/C_2H_2 HiPIMS does not strongly depend on the total pressure.

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