Measurement of the growth and properies of 2D material amorphous boron nitride by regulating growth conditions in CVD

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In this paper, a large array resistive membrane device was manufactured by controlling the crystal characteristics of the film by controlling the growth conditions. Resistant Random Access Memory (RRAM) is the next generation of nonvolatile memory types. It is a two-terminal resistance switching device with a metal/insulator/metal (MIM) vertical structure and is composed of Au/ a-BN /Au. Amorphous boron nitride (a-BN) is grown using ammonia borrane as a dielectric material. Changes in film state, dielectric thickness, and crystal structure were analyzed by controlling various growth conditions, and boron nitride characteristics were found to be obtained through Raman spectrometer measurement and TEM images.

RRAM uses a phenomenon in which a filament is generated when a voltage high enough is applied to a nonconductive material, and thus a path through which a current may flow, thereby lowering resistance. When a voltage is applied, ions agglomerate to form a filament. It may be seen that the electrical characteristic is measured to have a memory characteristic having a memory window through the generation of such a filament. Through these measurements, the film states of various BNs were analyzed by controlling the growth conditions, and similarly, the RRAM with high electrical characteristics was implemented by controlling the growth conditions. Thus, a better RRAM element may be made using amorphous BN.

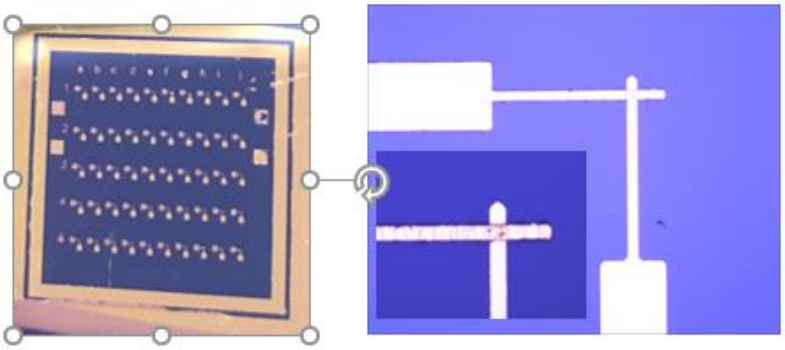

Figure. 1 OM imgae of RRAM device made with MIM structure