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(54) Title: SEMICONDUCTOR STRUCTURE AND SEMICONDUCTOR DEVICE INCLUDING A DIODE STRUCTURE AND METHODS OF FORMING SAME

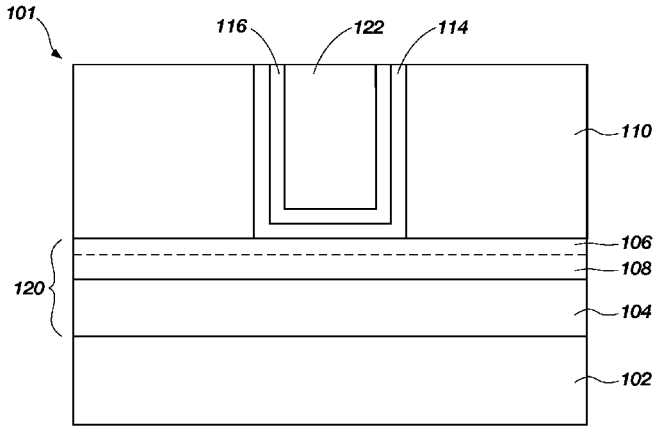


FIG. 8

(57) Abstract: Methods of forming diode structures for use in memory cells and memory arrays, such as resistive random access memory (RRAM). The methods include forming a first electrode by chemisorbing a graphite material (e.g., graphene) on a conductive material. A low k dielectric material may be formed over surfaces of the first electrode exposed through an opening in a dielectric material overlying the first electrode, followed by formation of a high k dielectric material over the low k dielectric material. A remaining portion of the opening may be filled with another conductive material to form a second electrode. The first and second electrodes of the resulting diode structure have different work functions and, thus, provide a low thermal budget, a low contact resistance, a high forward bias current and a low reverse bias current. A memory cell and a memory array including such a diode structure are also disclosed.

WO 2012/109051 A2