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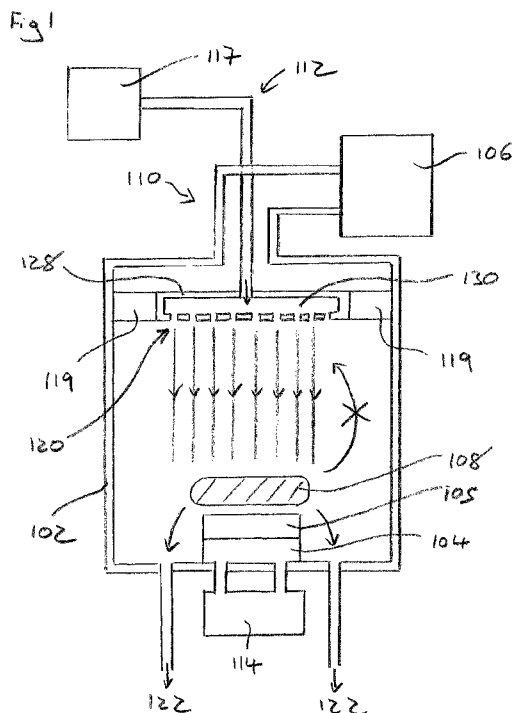
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- (54) **Title:** A MICROWAVE PLASMA REACTOR FOR MANUFACTURING SYNTHETIC DIAMOND MATERIAL



- (57) **Abstract:** A microwave plasma reactor for manufacturing synthetic diamond material via chemical vapour deposition, the microwave plasma reactor comprising: a plasma chamber; a substrate holder disposed in the plasma chamber for supporting a substrate on which the synthetic diamond material is to be deposited in use; a microwave coupling configuration for feeding microwaves from a microwave generator into the plasma chamber; and a gas flow system for feeding process gases into the plasma chamber and removing them therefrom; wherein the gas flow system comprises a gas inlet nozzle array comprising a plurality of gas inlet nozzles disposed opposite the substrate holder for directing process gases towards the substrate holder, the gas inlet nozzle array comprising: at least six gas inlet nozzles disposed in a substantially parallel or divergent orientation relative to a central axis of the plasma chamber; a gas inlet nozzle number density equal to or greater than 0.1 nozzles/cm², wherein the gas inlet nozzle number density is measured by projecting the nozzles onto a plane whose normal lies parallel to the central axis of the plasma chamber and measuring the gas inlet number density on said plane; and a nozzle area ratio of equal to or greater than 10, wherein the nozzle area ratio is measured by projecting the nozzles onto a plane whose normal lies parallel to the central axis of the plasma chamber, measuring the total area of the gas inlet nozzle area on said plane, dividing by the total number of nozzles to give an area associated with each nozzle, and dividing the area associated with each nozzle by an actual area of each nozzle.



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