SYNTHETIC CVD DIAMOND

ABSTRACT

A chemical vapour deposition (CVD) method for synthesizing diamond material on a substrate in a synthesis environment, said method comprising: providing the substrate; providing a source gas; dissociating the source gas; and allowing homoepitaxial diamond synthesis on the substrate; wherein the synthesis environment comprises nitrogen at an atomic concentration of from about 0.4 ppm to about 50 ppm; and and wherein the source gas comprises: a) an atomic fraction of hydrogen, H_f, from about 0.40 to about 0.75; b) an atomic fraction of carbon, C_f, from about 0.15 to about 0.30; c) an atomic fraction of oxygen, O_f, from about 0.13 to about 0.40; wherein $H_f + C_f + O_f = 1$; wherein the ratio of atomic fraction of carbon to the atomic fraction of oxygen, C_f:O_f, satisfies the ratio of about 0.45: 1 < C_f:O_f < about 1.25: 1; wherein the source gas comprises hydrogen atoms added as hydrogen molecules, H_2, at an atomic fraction of the total number of hydrogen, oxygen and carbon atoms present of between 0.05 and 0.40; and wherein the atomic fractions H_f, C_f and O_f are fractions of the total number of hydrogen, oxygen and carbon atoms present in the source gas.

No Figure