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플라즈마 기상 증착법에 의한 보론카바이드 박막의 RF 변화에 따른 효과

Effect of Boron carbide thin films with RF power by plasma enhanced chemical vapor deposition

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These are really only four elements suitable for forming solid state semiconductor neutron detectors - B, Cd, Gd and Li Lithium semiconductors exist ($LiInS_2$, $LiInSe_2$, LiZnP) but are difficult to fabricate reliably into devices and are very difficult materials with which to work Gd conversion-layer-based Si diodes have been fabricated and proposed for neutron detection, but are unlikely to be particularly stable Cadmium zinc telluride has yielded thermal neutron detection and the Cd neutron capture cross section is high, but the neutron capture produces such high energy γ-rays(>0 5 MeV) that the detectors must be large in order to detect these γ-rays efficiently

Boron absorbs neutrons efficiently and should yield an excellent solid-state detector if a suitable semiconductor material is found recently, a very robust, structurally forgiving boron-rich semiconductor-boron carbide prepared by chemical vapor deposition (CVD) methods-has successfully been used in heterojunction diodes, homojunction diodes, transistors, and tunnel diodes Here we demonstrate that this semiconductor yields single neutron detection and forms the basis for a whole class of solid state neutron detectors.

The samples were fabricated by PECVD from a single source compound closo-1,2-dicarbadodecaborane ($C_2B_{10}H_{12}$, orthocarbonane)

The substrates were further cleaned by Ar^+ bombardment at 200~500mTorr, 30W in the vacuum system Deposition was carried out in a custom designed 13 56 MHz radio-frequency plasma enhanced chemical vapor deposition (PECVD) reactor

Ohmic connections were made to Si and BC(boron carbide) layers by Ag Physical and electrical properties were analyzed