

## Thin Film Coatings for Neutron Detector Applications

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The Helium-3 crisis requires development of a new generation of neutron detectors. Several suitable alternatives to gaseous helium-3 are solid materials that can be deposited as thin films. These neutron conversion materials require specific thin film development for very particular properties. In this contribution we present neutron converters that are developed using materials theory, advanced diagnostic techniques, and industrial production processes. Thin films of boron-10 enriched boron carbide are vital ingredients in many of the replacement technologies under investigation. We show that it is possible to produce large areas with excellent adhesion at low cost in a production scale magnetron sputter deposition system. Low and high temperature chemical vapor deposition processes for production of this material are also outlined. Finally, depositions of exotic GdN-based coatings are shown, as predicted from first principles calculations. Theory and experiments have throughout the work been applied in parallel to optimize the coating quality, in particular in terms of adhesion, thickness, composition, and neutron detection performance.

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