

Development of Micromegas detectors with high radio-purity and energy-resolution using a thermal bonding method for the PandaX-III experiment

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High pressure gaseous Time Projection Chamber (TPC) with Micromegas, which is considered to be a very attractive solution for the next generation of ton scale $0\nu\beta\beta$ experiment, features the high granularity, high energy resolution, and low radioactive background. The PandaX-III experiment adopted the TPC scheme and will search for $0\nu\beta\beta$ of Xe-136 at China Jinping Underground Laboratory. In this work, we present R&D of Micromegas with thermal bonding method at USTC. Thermal bonding Micromegas offers spark-resistant and dead-channel-free readout modules for readout. We first report the specific design and manufacturing process for this radio-pure and high energy resolution Micromegas detector with active area of $200\text{mm}\times 200\text{mm}$. The prototypes were characterized under 10 bar pressure and the performance such as gas gain, energy resolution, and long-term stability etc, were studied in detail, and the results are presented and show a promising solution for PandaX-III experiment.

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