

# Assembly of Large-Area Planar MCP-based Photo-Detectors Without Vacuum Transfer of the Window

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## Abstract

In order to enable high volume production of MCP-based photo-detectors such as the LAPPD<sup>TM</sup>, we are developing an assembly process that does not involve a vacuum transfer. In this process a hermetic seal between the top window and the detector body is done during the detector bake-out. Photo-cathode synthesis is done next by using a pre-deposited antimony layer on the window and by introducing alkali metals into the sealed detector package through a small sealable vacuum port. We have developed a technique to make a hermetic indium vacuum seal between a glass window and detector body along the 90-cm-long perimeter. We have demonstrated cesium transport from a source outside of the detector package to the entire surface of the detector window in the presence of two full-size 20×20 cm<sup>2</sup> MCPs inside the detector. I will discuss the metallurgy of the indium seal and preliminary results of the first few photo-cathode synthesis attempts. An additional wrinkle towards high volume production is the *inside-out* readout scheme, in which the anode inside the vacuum package is made out of a uniformly evaporated resistive metalization layer capacitively coupled to the readout pads or strips outside of the vacuum package. This allows for manufacturing of a generic vacuum detector package with the readout structure being completely independent of the vacuum assembly and being optimized separately to meet the needs of a specific application.