

3M Advanced Materials Division

# 3M™ Controlled Porosity Reservoir Cathodes

## Introduction

3M™ Controlled Porosity Reservoir Cathodes are used in a number of specialized vacuum tube applications. They provide a virtually unlimited and uniform supply of barium to the cathode surface. The amount of barium supplied can easily be controlled by altering the cathode's design parameters.

## Benefits

- Higher current density operation reduces beam compression and relaxes or eliminates axial alignment tolerances, matching electrostatics and magnetostatics
- 2 to 4 times the life expectancy of conventional cathodes
- Uniform emission throughout the life of the cathode (see Fig. 1)
- Significantly reduces system design requirements
- Improves beam quality
- Selectable diffusion rate for current density
- This technology enables the production of smaller size and dome-shaped cathodes
- Relatively insensitive to spacing between the cathode and focus electrode
- Little or no edge emission
- Reduces barium deposition on Adjacent Critical Surfaces

We are involved at each stage of the cathode manufacturing process, from basic raw materials through the manufacturing of critical components to final assembly. This includes chemical cleaning of the emitting surface to ensure open porosity. Porosity is verified using scanning electron microscopy. All cathode heater assemblies, if applicable, are tested for proper heater operation. Our quality systems can provide fully qualified cathode assemblies with all required backward and forward material and process traceability.



3M™ Controlled Porosity Reservoir Cathode

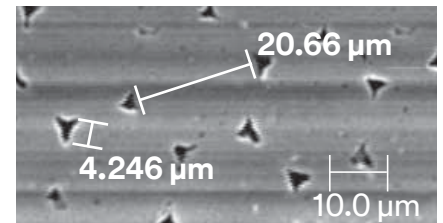
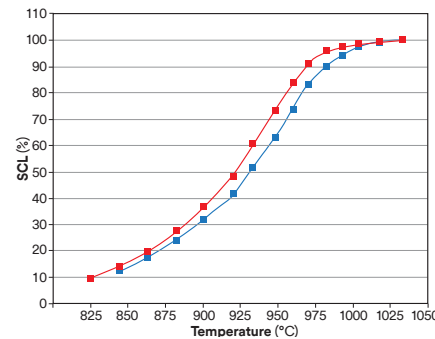


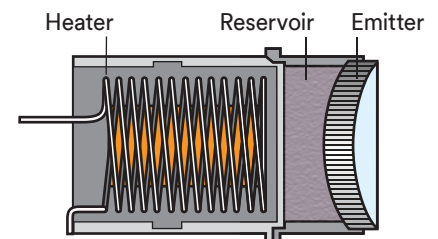
Figure 1. Cathode lifetime



Life test data shows performance improving with age.

## 3M™ Remote Access Data Acquisition and Recovery System (RADAR)

The manufacture of quality components for Vacuum Electron Devices (VEDs) used in the communications, space



and defense industries requires precisely-controlled and traceable process steps. Based on 60 years of industry experience, we offer customers a proven software solution that can help automate and simplify their data collection, training and documentation requirements through 3M™ Remote Access Data Acquisition and Recovery System (RADAR).

The 3M remote access data acquisition and recovery system is a suite of software communications tools. Its purpose is to establish best practices for controlling the manufacture of cathodes and cathode assemblies, and to provide customers with all required backward and forward material and process traceability. The system acts as a “bridge,” allowing the exchange of data between multiple software platforms.

RADAR provides nearly instantaneous access to any combination of data, including:

- Employee Training and Task Qualification Records
- ISO Procedures and Revision Control System
- Engineering Drawings and Methods Sheets
- Materials Data Collection and Serialization
- Equipment Process Control and Monitoring System
- SCADA Notification System
- Plant Wide Environmental Controls System

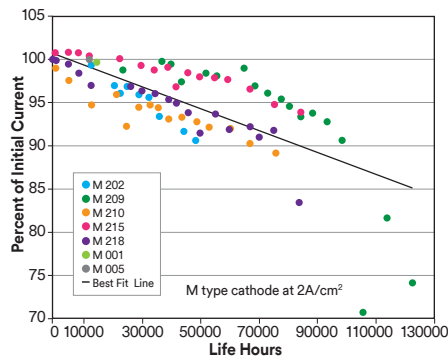
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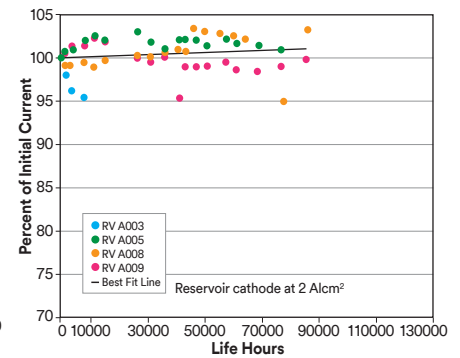
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More uniform emission through life of the cathode



Raw data can also be made available for manipulation in the Infinity QS SPC platform or can be delivered directly to the customer for analysis. This remote access system is fully integrated and provides the user with the power of information 24/7.



Named a winner of the 2011 R&D 100 Awards by R&D Magazine



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