LAPPD Program Review
December 9-10, 2012
Argonne National Lab

Microcapillary Plate Development

Chris Craven (presenter)
Dan Bennis
Michael Detarando
John Escolas
Michael Minot
Joe Renaud
• 8” x 8” plates shipped 10/25/11
  • Known features vs. functionality: how are they?
  • Bevel to indicate bias
  • Packaging

• Next batch of 8” x 8” plates currently being fabricated
  • Schedule
  • Processing advancements
  • Questions about logistics

• NiCr coating
8” Plates Shipped 8/25/11

Details

- 17 “Production Grade,”
  3 “Development Grade”
- In Berkeley-designed individual SS carriers
- Shipped in one Pelican case
- Inspection report for each plate
Quality much improved over previous batches

- Finishing
- Cleaning
- Unfortunately this block has a significant flaw in the center, present in every plate

Next step for this group of plates: relate “features” to performance
Mechanical defects

- **Cracks**
  - 12258-532

- **Scratches**
  - 12258-532

- **Chips**
  - 12258-529
  - 12258-538

Present in “production-grade” plates, but minor, and usually on edges

8/25/11 Shipment

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Known Features in 8/25/11 Shipment

Glass defects

Undersized capillaries (12258-544)

Undersized capillaries are present in center of all plates from this block

Prev. batch, plate #23

Job #524111 (before polish)
Debris in capillaries
  • Grey bands from slicing
  • Brown regions from filling
  • White bands from polishing

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Polishing artifact

Visually appears as a haze under certain lighting, microscopically appears as chips on surface

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Inspection Map for Each Plate

Let us know what ruins plates!

Bevel in upper left corner, front face
Bevel to Indicate Bias Orientation

Is bevel satisfactory?

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Next Batch of 8” x 8” Plates

- Off wire saw 12/1/11
- Packaged, driven from PA to Incom, kept wet

~140 slices from block
Next Batch of 8” x 8” Plates

- Cleaning begun 12/2/11
- Next steps
  - Grind, polish, form
  - Final clean
  - Inspect, & ship

3x bigger batch size than before.
Equipment & tooling bottlenecks are being identified.
8” x 8” plates
• Order for 100, + balance of 5 from prev. order
  • 20 on 1/6/2012
  • 20 on 1/20/2012
  • 20 on 2/3/2012
  • 20 on 2/17/2012
  • 20 on 3/2/2012
• How do we ship?
  • Stainless steel carriers
  • Pelican case

33 mm dia. disks
• Order for 100 due 1/6/2012
• Entegris carriers?

Shipments now expected to begin in early February.
Carriers & cases need to be figured out
Quotes obtained by Incom for NiCr coating

- At 1:1 diameter:depth ratio
- Vendor experienced with off-axis rotation during coating
- Class-1000 cleanroom
- Pre-cleaning capabilities
  - Aqueous/ultrasonic for particulate
  - Plasma for atomic-level surface prep

To go along with quotes gathered by Henry

If ALD after NiCr (or even before), Incom ready to provide NiCr-coated plates
Scale-Up Initiatives

• **Capacity increases**
  - Drawing/assembly
  - Spray cleaning
  - Oven
  - Ultrasonic
  - Racks/cleaning vessels
  - Product transport

• **Quality/uniformity**
  - Process improvements
  - Inspection station
  - Inspection reports with shipments
  - Continued transfer from R&D to Production

• **Cost reduction**
  - Labor
  - Materials
  - Consumables

For quantities of 100+ plates

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