

# Multi-Project Wafer (MPW) Runs of Full Custom Pitch Adapters

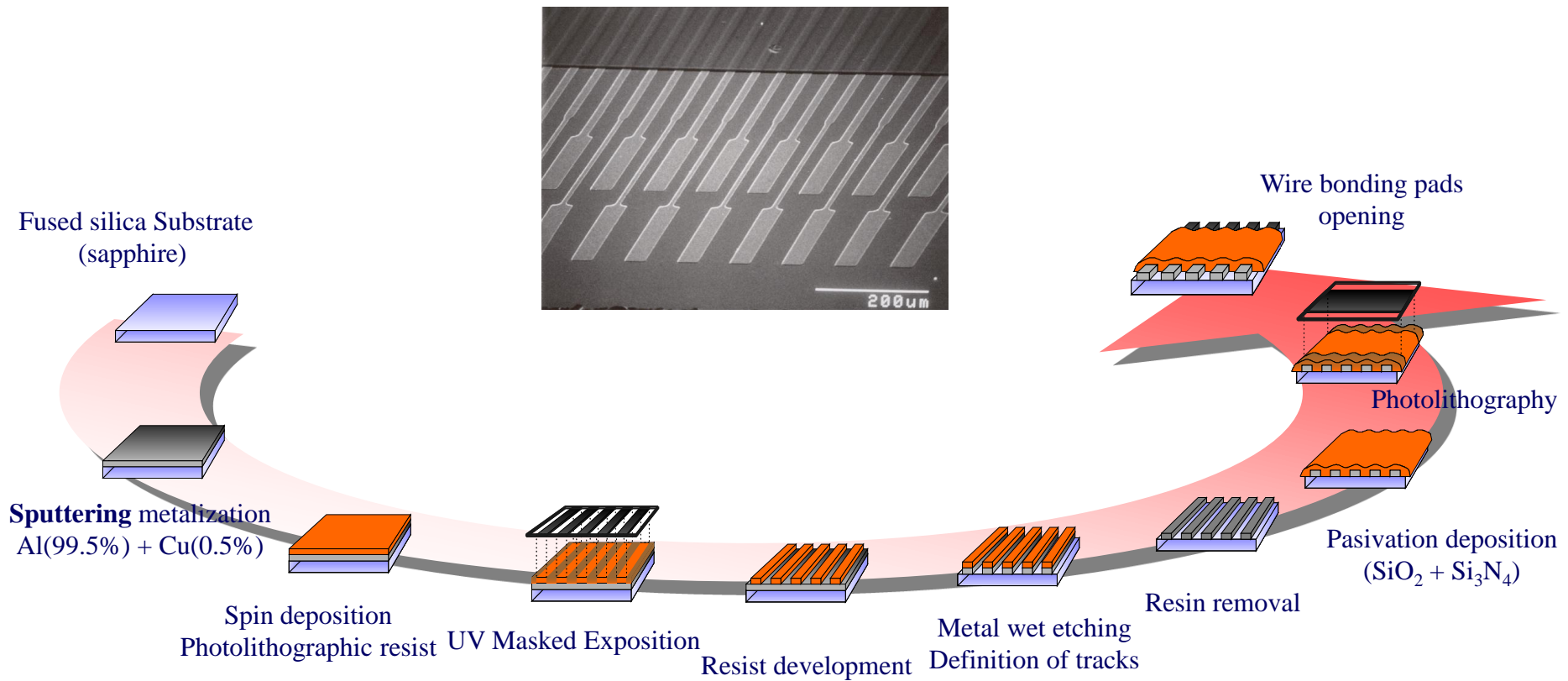
CNM (CSIC), Alibava Systems S.L.

Contact person: Miguel Ullán



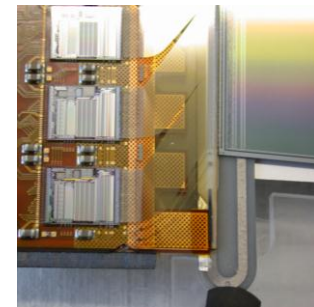
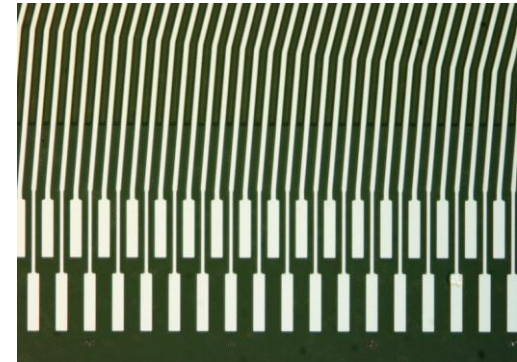
- Metal-on-Glass technology
- Pitch adapters
- Proposal
- Details
- Design
- Initial schedule
- Conclusion

## Microelectronic Metal-on-Glass Technology for PAs



## Main characteristics

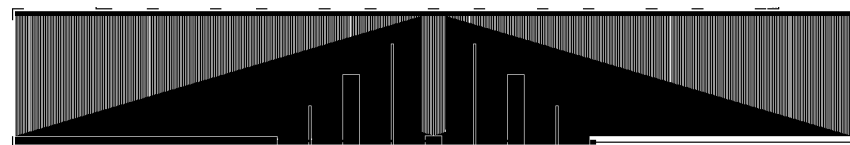
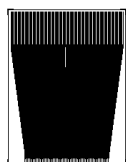
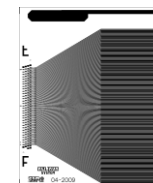
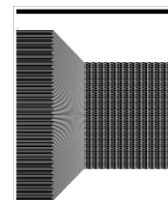
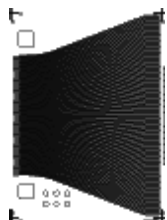
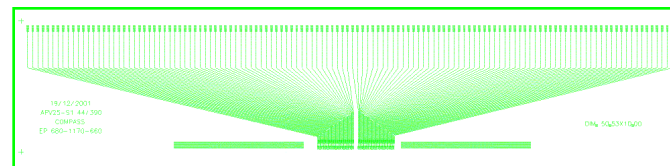
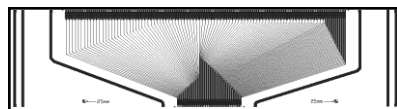
- High integration: minimum track width 10  $\mu\text{m}$
- Big die size: up to 500  $\text{mm}^2$
- Zero-defects
- Excellent bondability: Sputtered Al.
- Microelectronics-grade passivation
- Different substrates:  
Fused silica, sapphire, Si, ...
- Mechanical strength, Double side planarity, Thermal insulation, Low mass
- Radiation hardness



➤ *M. Ullán, et al. "High Pitch Metal-On-Glass Technology For Pad Pitch Adaptation Between Detectors And Readout Electronics", IEEE TNS, v. 51, n. 3, pp. 968-974, June 2004.*

# Pitch adapters

- End Cap SCT ATLAS (2003 – 2005)
  - Full production (10000 pieces)
- Others... (2004 – 2012)



But:

- A minimum batch of 10 wafers uses to be too much for most users
  - Hundreds of PAs
  - Experiments, prototyping, ...
  - Cost ( $\sim > 10$  k€)
- Sharing costs among many users for small series
- Multi-Project Wafer (MPW) Runs
  - Several PA designs in a single wafer mask
  - One batch

- Quantities
  - 20, 50, 120 units
  - Extra orders 40% reduction (if available)
- Passivated or not passivated
  - Most cases (experiments, prototyping) do not need passivation
- Standard: 0-defects, Untested: (20% reduction)
  - Most users do not need 0-defects
- Pricing in €/mm<sup>2</sup>:

<i>#Units</i>	<i>no pasivation</i>	<i>w/ pasivation</i>
<b>20</b>	15	<b>21</b>
<b>50</b>	<b>23</b>	32
<b>120</b>	45	64

+fix costs:            400                            700

- Examples:
  - minimum order of 20 1 cm<sup>2</sup> PAs, without passivation:  
100 mm<sup>2</sup> x 15 euro/mm<sup>2</sup> + 400 euro = 1900 euro
  - 50 passivated PAs with a total area of 2 cm<sup>2</sup>:  
200 mm<sup>2</sup> x 32 euro/mm<sup>2</sup> + 700 euro = 7100 euro

- Design rules:

(Some exceptions may apply, please contact us if your needs break some of the rules)

- Maximum die area:  $\sim 500 \text{ mm}^2$
  - Minimum area:  $100 \text{ mm}^2$
  - Maximum side length: 50 mm
  - Minimum feature size:  $10 \mu\text{m}$
  - Minimum separation:  $10 \mu\text{m}$
  - Design review
  - Rectangular cut
  - Minimum space between last feature and cut line:  $200 \mu\text{m}$
- Full custom design also provided by Alibava systems S.L.



# Initial Schedule

- Runs scheduled when enough participants
  - First call for proposals: end of January 2013
- Designs finished in ~1 month
  - Fabrication starting end of February (including mask fabrication)
- Total fabrication time (mask, clean room fabrication, test & cut)
  - 3 months
  - Pieces available: beginning of June 2013

# Conclusion

- Multi-Project Wafer (MPW) Runs of Pitch Adaptors made available for the detector R&D community and experimenters by CNM-Barcelona and Alibava Systems S.L.
- Initial call for design proposals end of January 2013
  - Full custom design offered by Alibava Systems
- Final designs to be ready by end of February 2013
- Pending to enough orders
- Contact:
  - [Miguel.Ullan@imb-cnm.csic.es](mailto:Miguel.Ullan@imb-cnm.csic.es) or [info@alibavasystems.com](mailto:info@alibavasystems.com)

Thank you

