Packaging of RMD APDs with External Mesh Electrodes on U-Penn Amplifiers

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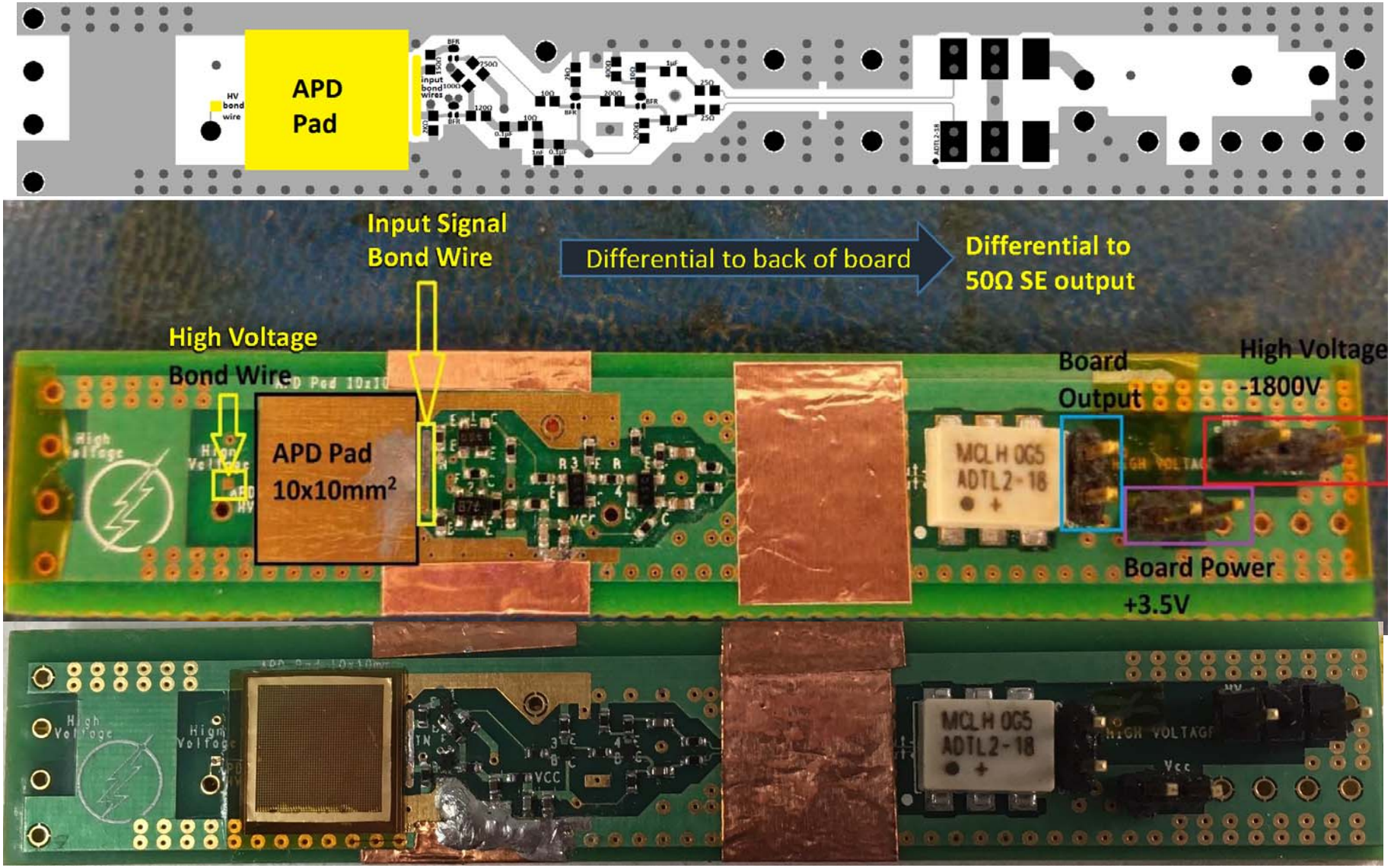
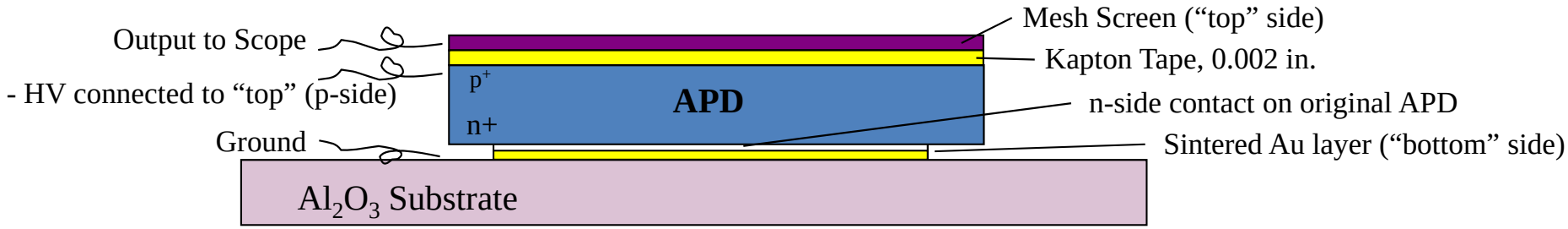


RMD 8x8 mm² APD – Al-mesh-screen scenario (Nov. 15, 2012)

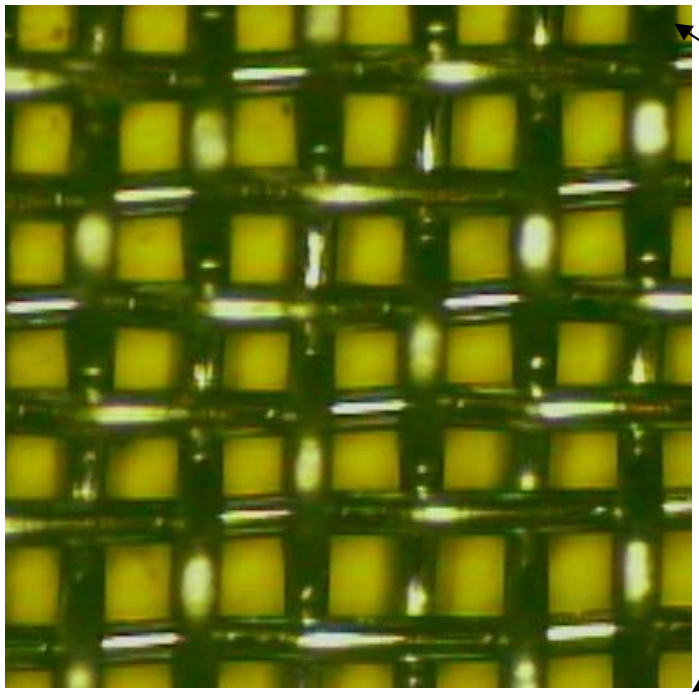
http://physics.princeton.edu/~mcdonald/LHC/Tsang/APD_8x8mm_mesh_screen_111512k.ppt

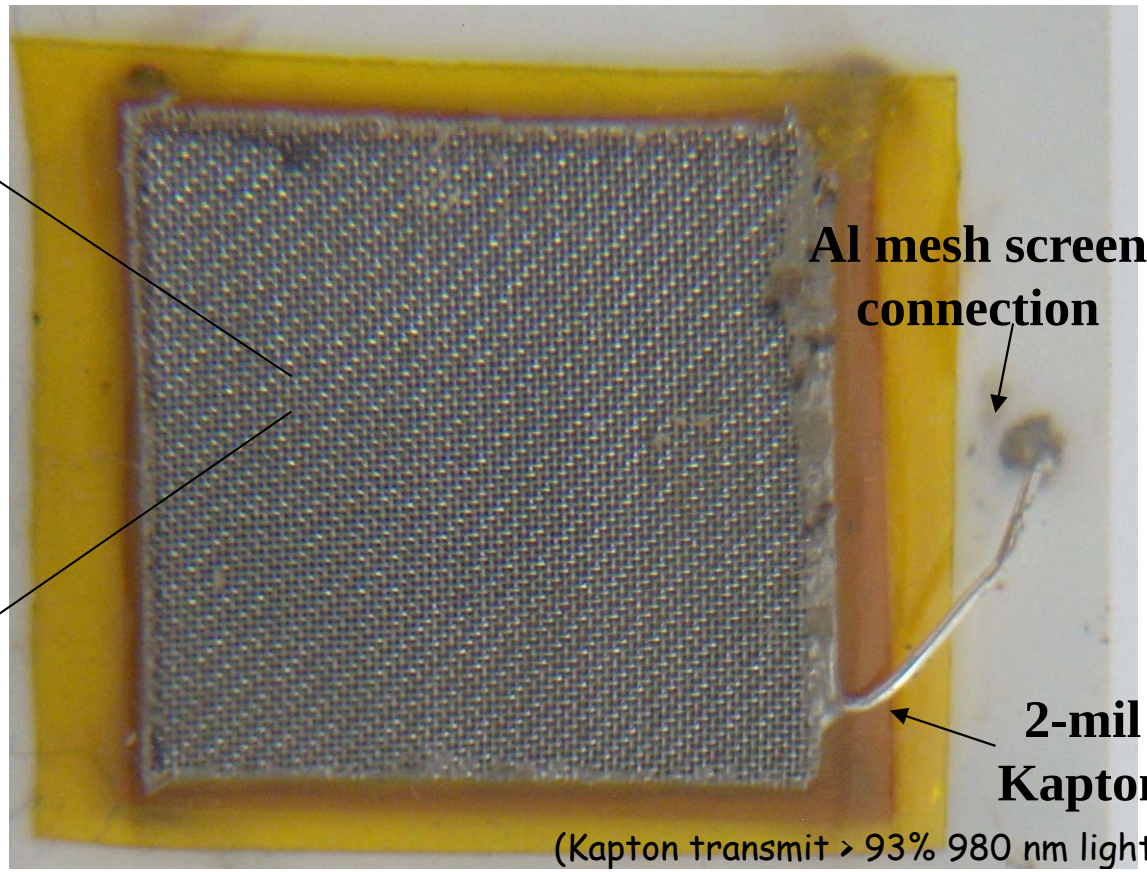
Sketch by Thomas Tsang



Contact between screen and n+ side made by Au epoxy thru hole in Kapton

McMaster 9227T417, 200 mesh, 33.6% open





2017: Magnetron Sputtering of Top/Bottom APD Contacts

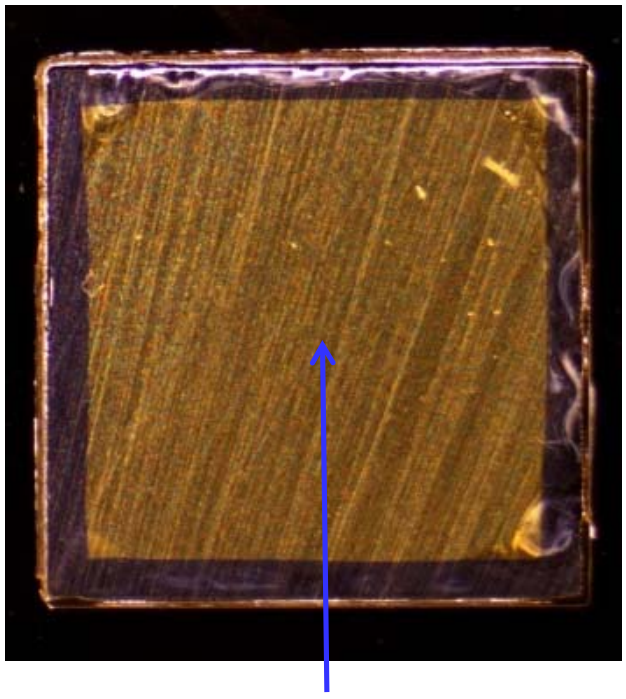
A bare RMD APD die is 10x10 mm^2.

The sensitive area is about 8x8 mm^2.

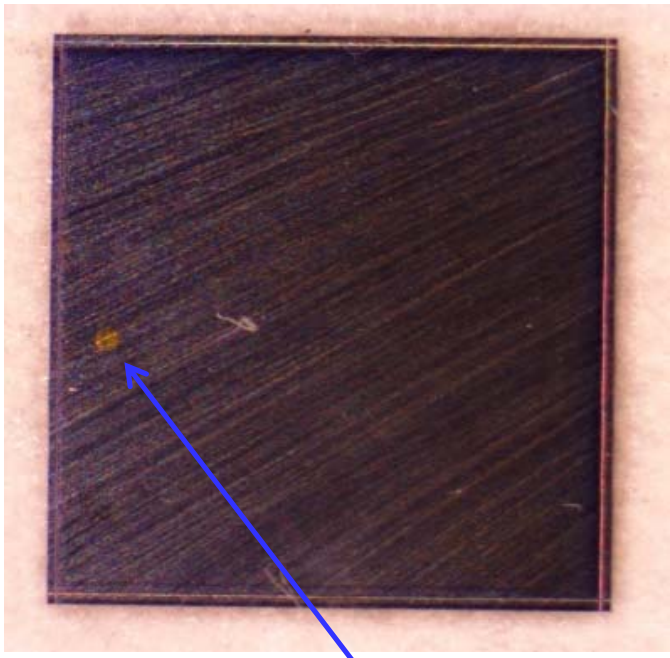
The top (p-side) is photosensitive. A small electrical contact is made to the top side.

The bottom (n-side) has a 7x7 mm^2 "mesa," which serves as a large electrical contact.

These contacts are made by sputtering Ti/Au layers of 20/200 nm.

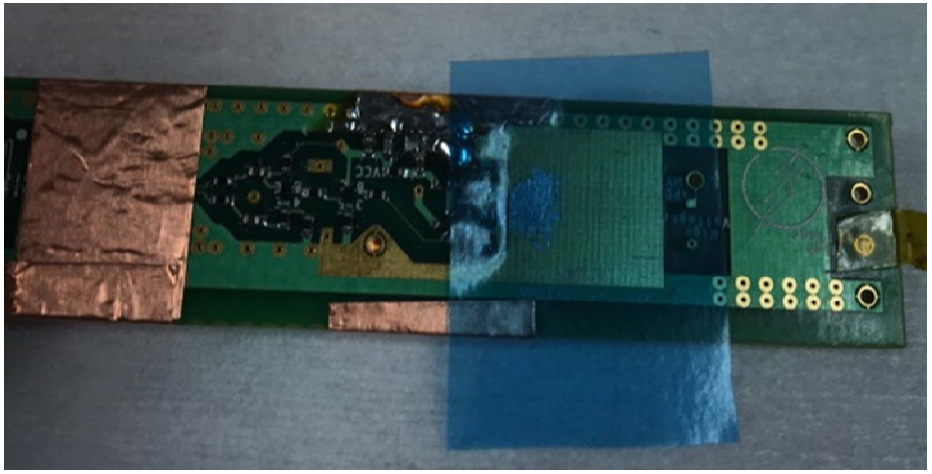


Bottom Contact (Mesa)

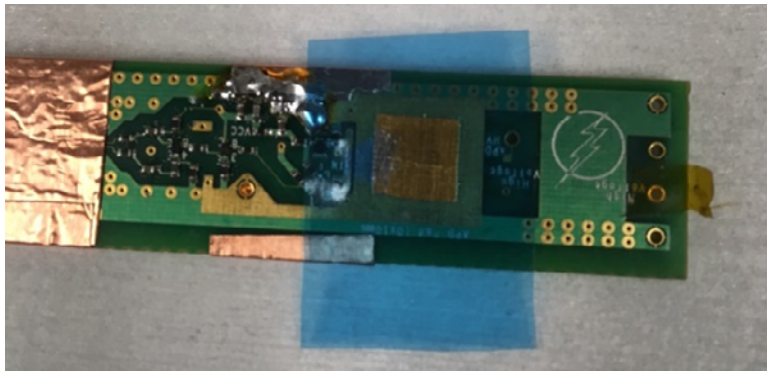


Top Contact (Dot)

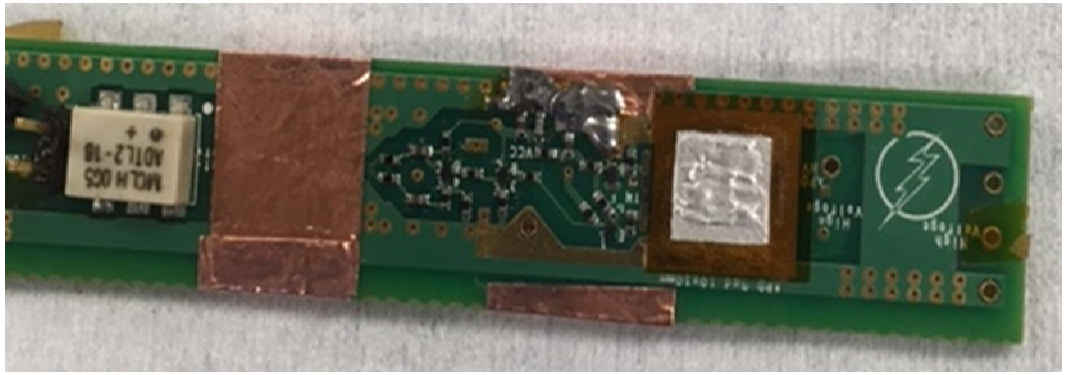
Applying the conductive H22E Epotek Silver Epoxy to the 10x10 mm^2 Contact Pad of the Penn PCB



Apply Thin Film (50 μm) Adhesive

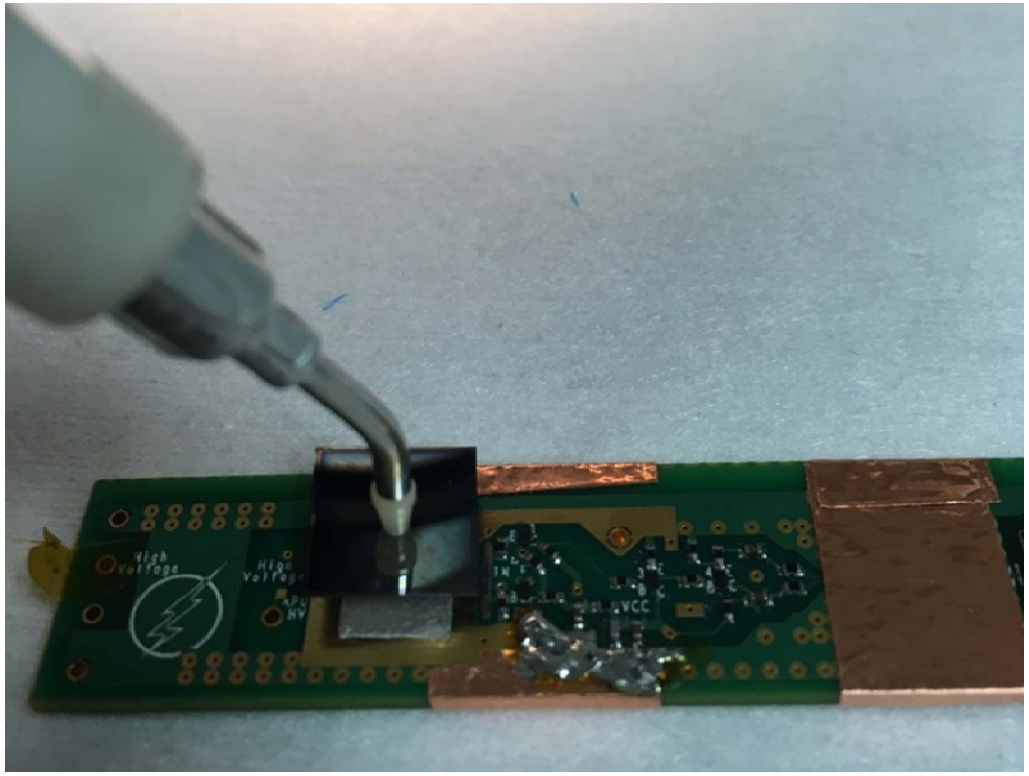


Create 7x7 mm^2 opening in Mask



Apply Silver Epoxy, Remove Mask

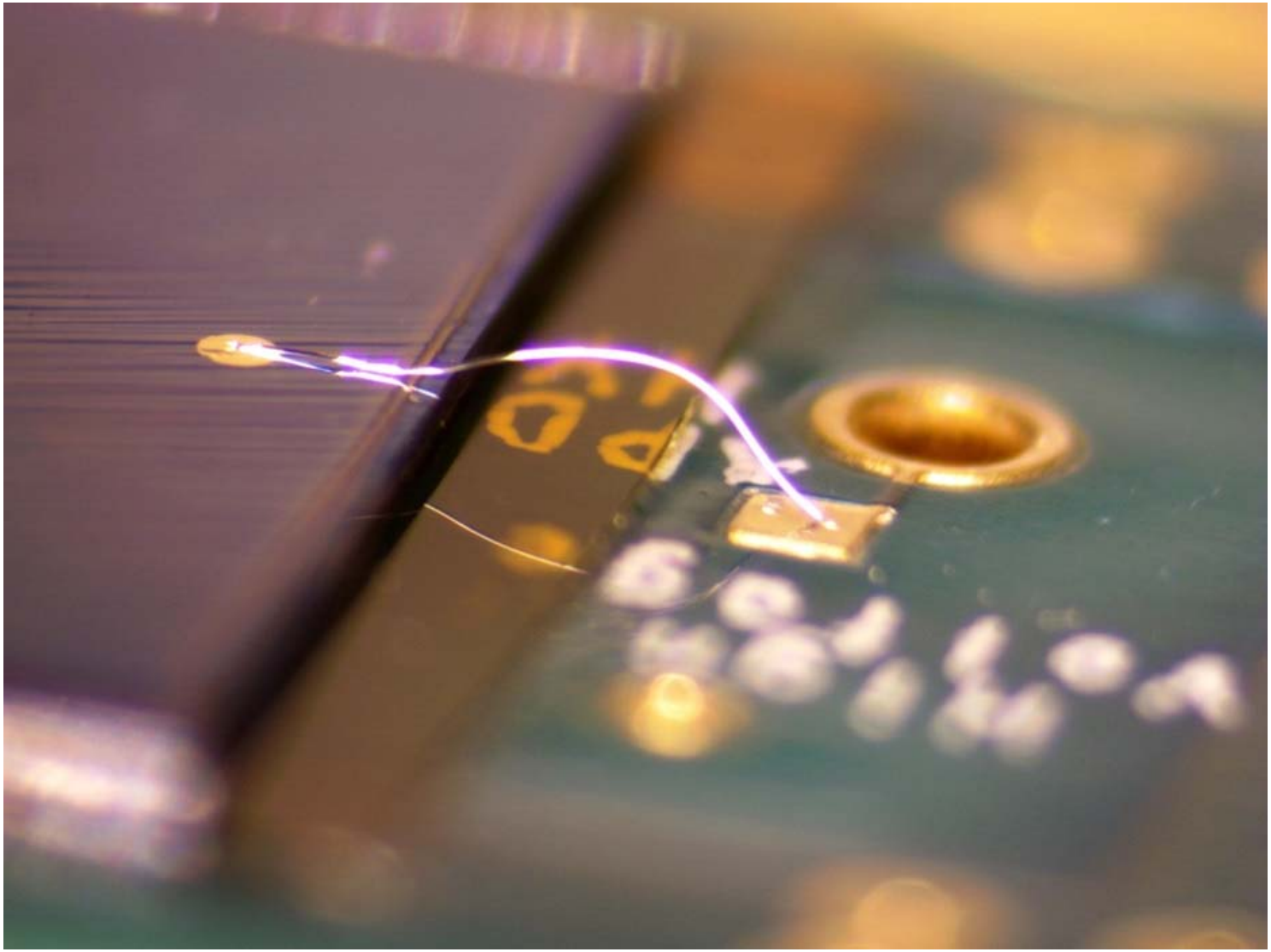
Die Bonding of the APD



Placing APD onto epoxy

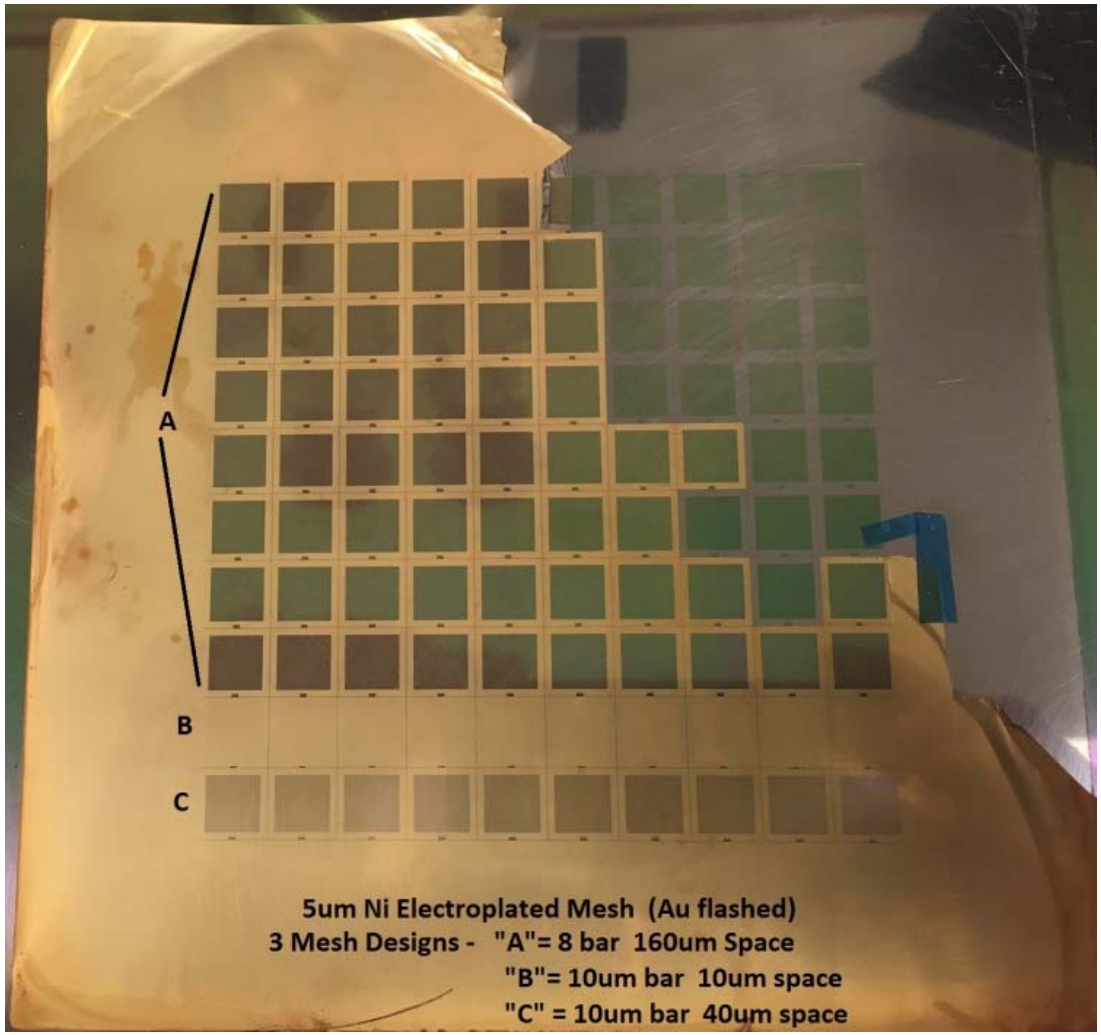
Cure Epoxy in Vacuum Oven
5 Minutes @ 150C

Wire Bond Top Contact (for –HV)



25-μm-Al Wirebond (Wedge)

Electroplated Ni Mesh



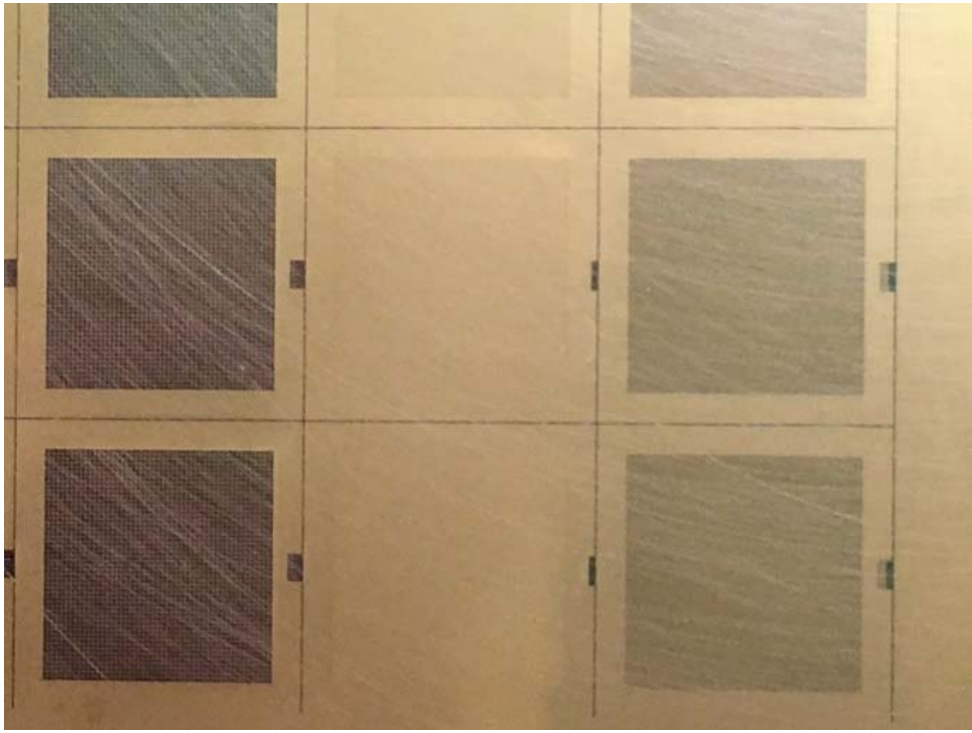
5-μm sheet of 100 electroplated Ni meshes (Au flashed).

3 Mesh Designs:

A = 8-μm bar, 160-μm spacing, 90% open

B = 10-μm bar, 10-μm spacing, 11% open

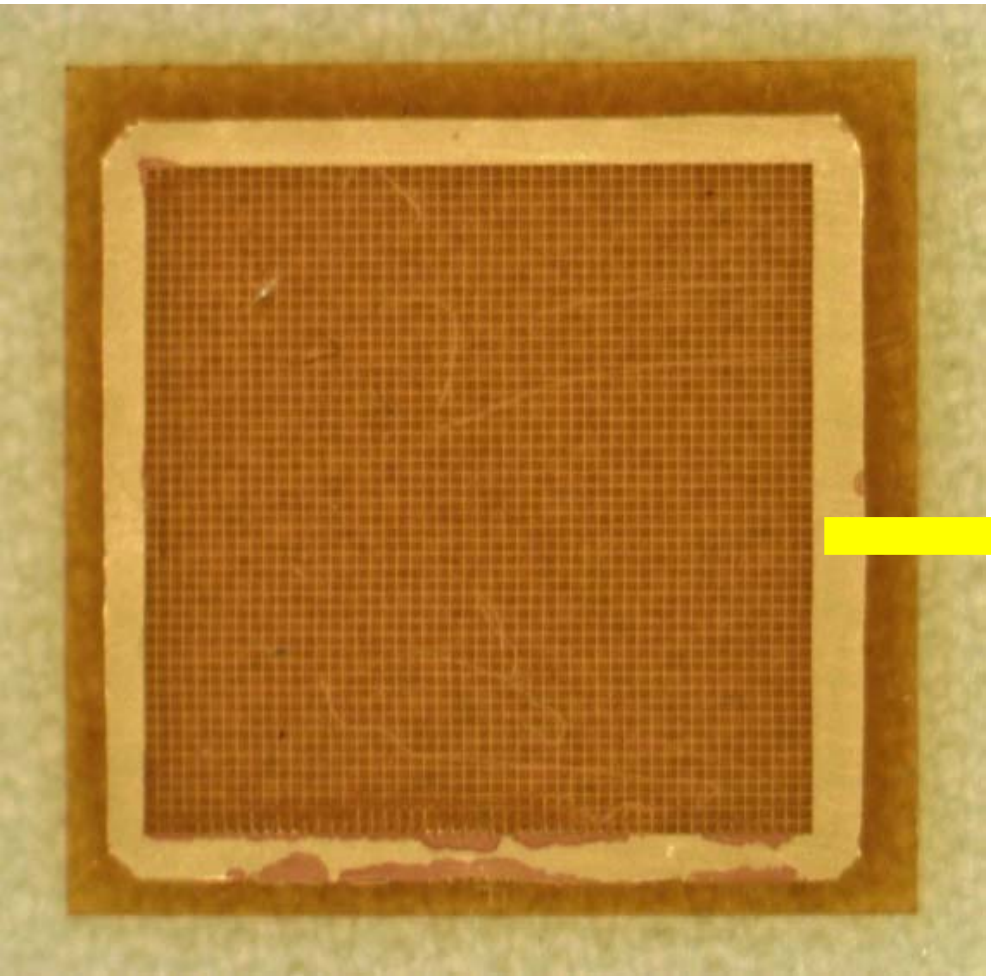
C = 10-μm bar, 40-μm spacing, 64% open



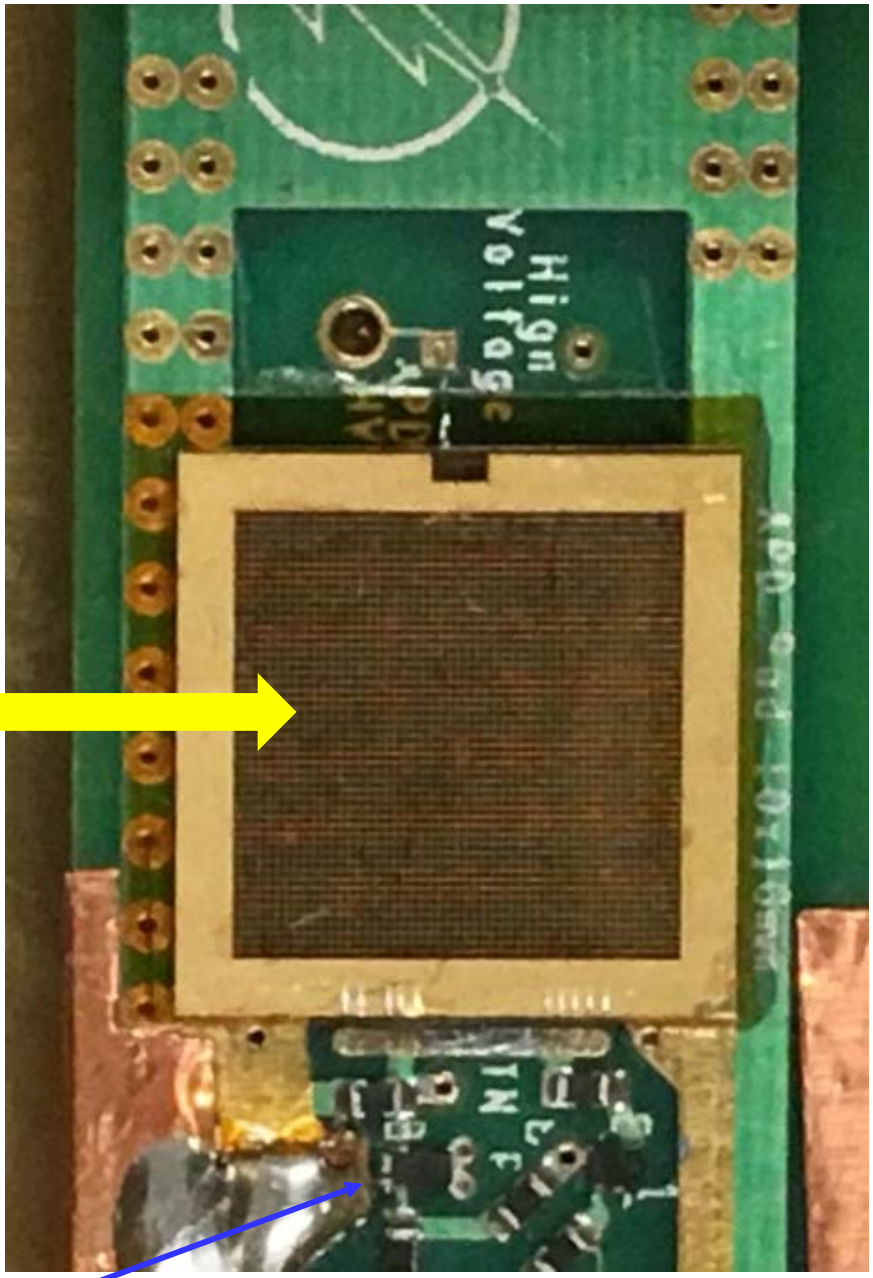
A B C

We use the type A meshes now.

Mount Mesh on the APD



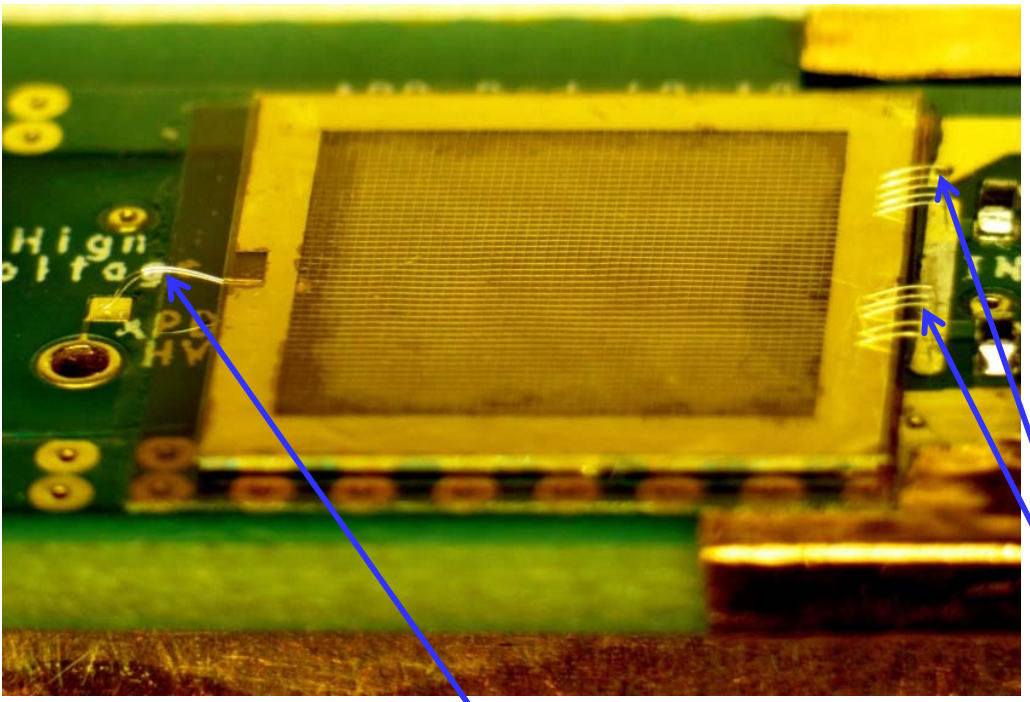
Type A Mesh mounted on 50-μm Kapton
(100-nm-Au flashed)



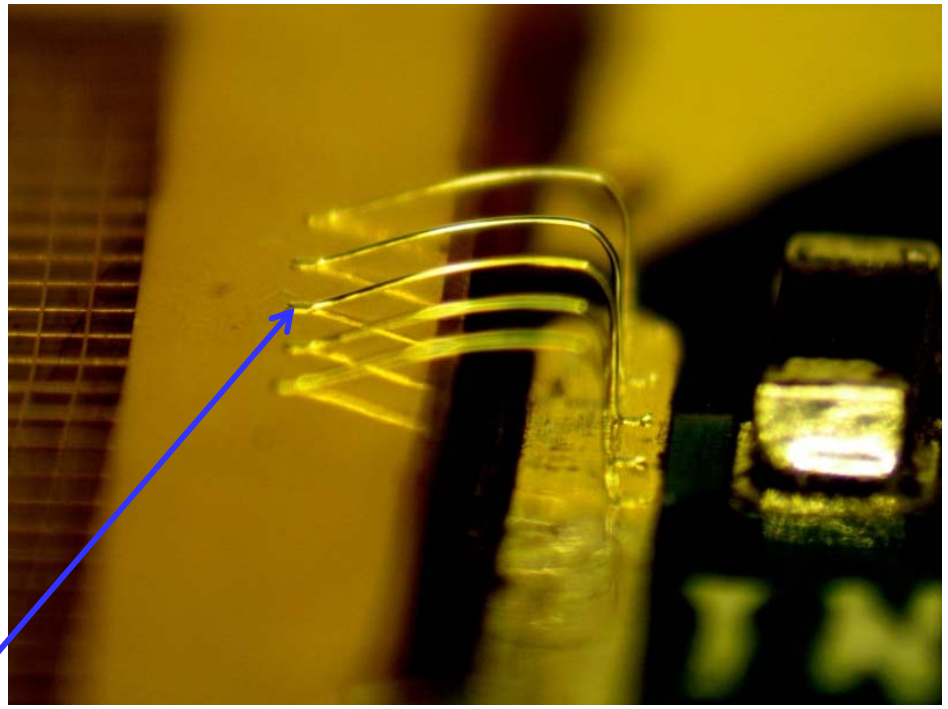
Mesh mounted on APD

First transistor of the preamp

Wirebond Mesh to Amplifier Input



-HV Wirebond to top (p-side) contact



Mesh Signal Wirebonds

This version of the preamp/APD operates with the bottom side of the APD at ground, its top side at –HV, and the mesh at ground.

Completed APD / Amplifier