Modification of CBM-STS micro-cable stack-up*

D. Soyk[1], *C.J. Schmidt*[†1], *V. Kleipa*[1], *I. Sorokin*[1], *the CBM collaboration*[1], *and the FAIR@GSI RBDL*[1]

[1]GSI, Darmstadt, Germany

During several years of development of the CBM modules, the STS sensors and the CBM STS-XYTER chips were carefully studied and designed. Despite this careful evolution, the design and study of the connecting part between the sensor and the chip had not been addressed in such intensity. Some studies on the electrical behavior were performed, while all questions of cable stockage were addressed this year. In [1] the cross section of the cable - like it was used for the electrical simulation - is described.

In figure [1] the modified cable stack-up is shown.

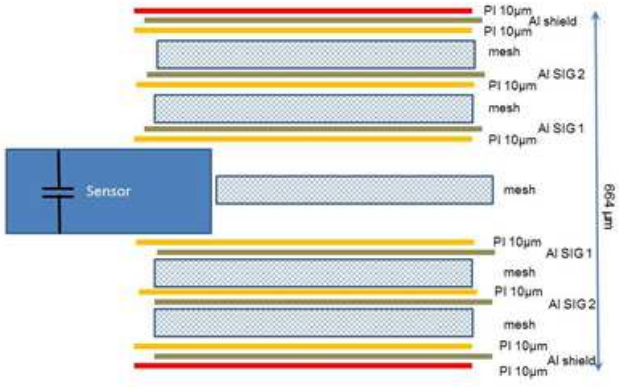

Figure 1: Schematic side view of the micro cable stack up for one CBM module. The red layer on the top and the bottom of the cable is the newly introduced insulation layer. In the middle, at the side of the sensor, the meshed layer to reduce crosstalk between the two sensor sides was newly introduced.

The geometry of the signal strands with a height of 14μm and a width of 46μm is kept, also the pitch between the strands remains 116μm on each signal layer. As substrate for the strands 10μm thick polyimide will be used.

The thickness of the mesh will be kept at 100μm, but a study is beeing done to find a mesh material with a lower mean dielectric constant.

Also a additional layer of meshed material will be inserted between the microcable for the n- and p-side of the sensor. With this layer the crosstalk between the signals of both sensor sides should be minimized.

The shielding layer will be modified. The thickness of the aluminum will be reduced to 14μm (instead of 30μm) and the polyimide will have a thickness of 10μm (instead of 20μm). With these changes the same aluminium polyimide film may be used for the signal layers, as well as for the shielding layers.

Due to the fact that the sensors of different modules of a ladder are on different potentials, it could be an advantage to introduce a additional layer of polyimide insulation on the outside of the shielding. This allows us to keep the shielding potential for each sensor side and for each sensor in a ladder on a defined and independent level, namely the reference level of the pre-amplifier input stage. With these additional two insulating layers of 10μm and the meshed layer in between, the total thickness of the stack is 664μm per module.

The modified stack-up of the micro cable was already presented by C.J. Schmidt at the 24th CBM collaboration meeting in September 2014 [2]. The research for a mesh material with lower dielectric constant is ongoing. This cable stack-up will now be realized for the next module prototype.

References

[1] J. Heuser et al., Technical Design Report for the CBM Silicone Tracking System, GSI Report 2013-4, Darmstadt, ISSN 0171-4546, figure 4.10

[2] C.J. Schmidt, “Status of module development”, 24th CBM Collaboration Meeting

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† c.j.schmidt@gsi.de

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