From: Miroslav Georgiev Atanasov
Sent: 18 July 2016 08:35
To: Nicolo Biancacci
Subject: RE: Graphite/CFC Cu coating experience

Great, thanks a lot;]]
Miro

From: Nicolo Biancacci
Sent: 18 July 2016 08:31
To: Miroslav Georgiev Atanasov <miro.atanasov@cern.ch>
Subject: Re: Graphite/CFC Cu coating experience

Hi Miro,

thanks for your email, everything is fine and hope the same for you!
No progress was done on the blocks unfortunately as I was taken by other tasks and measurements recently (as Molyb. coated blocks from Antonio).

I hope to start having a look this week and I'll keep you posted.

Cheers,

Nicolò

On 07/13/2016 11:23 AM, Miroslav Georgiev Atanasov wrote:

> Hello again,
> I hope you're doing well, and the little one too. Has there been some progress on the measurements for the TCDQ blocks?
> Regards,
> Miro

> **From:** Miroslav Georgiev Atanasov
> **Sent:** 01 March 2016 10:33
> **To:** Nicolo Biancacci <Nicolo.Biancacci@cern.ch>
> **Subject:** Re: Graphite/CFC Cu coating experience
>
> well, congratulations!
> no rush for the measurements really, just thought i'd see how things are going, and send u those files.
> regards
> miro
>
> On 01 Mar 2016, at 10:21, Nicolo Biancacci <Nicolo.Biancacci@cern.ch> wrote:
>
> > Hi Miro,
> > thanks for the infos. Measurements are in standby as I am in paternity leave until 9th March. If you are not in a hurry I can take them back afterwards.
> > Thanks,
> >
> > Nicolò
> > On 03/01/2016 09:43 AM, Miroslav Georgiev Atanasov wrote:
> >
> > > Hello,
> > > Just remembered I was supposed to send you some info on the TCDQ. Attached are a poster presented at last year's IPAC, and a presentation on the upgrade at one of our group's meetings. I also include an internal note on the impedance simulations from 2006. How are the measurements coming along? Anything interesting so far?
> > > Regards,
> > > Miro
> >
> > ---
> >
> > **From:** Miroslav Georgiev Atanasov
> > **Sent:** 01 February 2016 14:17
> > **To:** Nicolo Biancacci <Nicolo.Biancacci@cern.ch>
> > **Cc:** Antonio Lafuente Mazuecos <antonio.lafuente@cern.ch>
> > **Subject:** RE: Graphite/CFC Cu coating experience
> >
> > Great.. I can only bring them in the afternoon on Thursday though..say, around 14:00.
> > Regards,
> > Miro
> >
> > ---
> >
> > **From:** Nicolo Biancacci
> > **Sent:** 01 February 2016 14:13
> > **To:** Miroslav Georgiev Atanasov <miro.atanasov@cern.ch>
> > **Cc:** Antonio Lafuente Mazuecos <antonio.lafuente@cern.ch>
> > **Subject:** Re: Graphite/CFC Cu coating experience
> >
> > Hi Miro,
> > You can bring them on Thursday, I'll try to get them measured by Monday 8/02.
> > Cheers,
> >
> > Nicolò
> > On 02/01/2016 11:12 AM, Miroslav Georgiev Atanasov wrote:
> >
> > > Hi again,
> > > I'm ready with the blocks to measure (Al, graphite, CfC), so can we decide on a date. Since the graphite has been declassified we can easily do it in your lab. Let me know when it will be convenient for you.
> > > Thanks in advance,
> > > Miro
> >
> > ---
> >
> > **From:** Miroslav Georgiev Atanasov
> > **Sent:** 20 January 2016 16:00
> > **To:** Nicolo Biancacci <Nicolo.Biancacci@cern.ch>
> > **Subject:** RE: Graphite/CFC Cu coating experience
> >
> > Interesting development…It seems the blocks have been cleared..
> > https://edms5.cern.ch/asbuilt/plsql/mtf_equip.eqp_main_top?cookie=15458978&p_rec_id=CR-043713
> > So..I'll wait for the cleaning of the aluminium, and contact you early next week to decide upon a date.. Whili we are at it I think it will be a good idea to measure the CfC blocks that are installed in the current version of the TCDQ. There the surface is much rougher, so I wonder what the effect would be.
> > Regards,
> > Miro

From: Miroslav Georgiev Atanasov
Sent: 20 January 2016 15:35
To: Nicolo Biancacci <Nicolo.Biancacci@cern.ch>
Subject: RE: Graphite/CFC Cu coating experience

Right,
Depends on how cumbersome your measurement equipment is, and if you are willing to displace it ;]
The easiest would be to come to 867, but that's a bit far.. alternatively, I can propose 169 or 162.
Let me know
Miro

From: Nicolo Biancacci
Sent: 20 January 2016 15:23
To: Miroslav Georgiev Atanasov <miro.atanasov@cern.ch>
Subject: Re: Graphite/CFC Cu coating experience

Hi,
I have asked and we cannot store radioactive material in our lab.
Is there another place closeby?
Cheers,

Nicolò
On 01/20/2016 02:46 PM, Miroslav Georgiev Atanasov wrote:

> Thanks,
> I think I'll have the RP measurement done this week, and the aluminium block cleaned for next week.
> Is it authorised to bring the slightly radioactive (I expect <0.1) block to your lab?
> Miro
>
> ---
>
> **From:** Nicolo Biancacci
> **Sent:** 20 January 2016 14:40
> **To:** Miroslav Georgiev Atanasov <miro.atanasov@cern.ch>
> **Subject:** Re: Graphite/CFC Cu coating experience
>
> Hi Miroslav,
> the impedance lab is in 8-R-006.
> Cheers,
>
> Nicolò
> On 01/18/2016 08:50 AM, Miroslav Georgiev Atanasov wrote:
>
> > Hi,
> > I've ordered the aluminium, should be with us in a few days. In the meantime I am going to have the radioactive block measured. Please let me know where to bring it – I need the location for TREC.
> > Regards,
> > miro
> >
> > ---
> >
> > **From:** Nicolo Biancacci
> > **Sent:** 15 January 2016 15:34
> > **To:** Miroslav Georgiev Atanasov <miro.atanasov@cern.ch>; Antonio Lafuente Mazuecos <antonio.lafuente@cern.ch>
> > **Subject:** Re: Graphite/CFC Cu coating experience
> >
> > Hi,
> > We can give it a try. Could you fabricate an Al block of 20x75x250mm as well? It is necessary as our measurement is relative to a reference block of known material.
> > Thanks,
> >
> > Nicolò
> > On 01/14/2016 10:00 AM, Miroslav Georgiev Atanasov wrote:
> >
> > > Hello, and thanks for the quick response,
> > > I attach the small report from last week. The blocks are in graphite R4550 (1.75g/cm^3), Cu coated on a Ti flash.
> > > The blocks measure 72x75x250mm.
> > > Regards,
> > > Miro
> > >
> > > ---
> > >
> > > **From:** Nicolo Biancacci
> > > **Sent:** 14 January 2016 09:55
> > > **To:** Miroslav Georgiev Atanasov <miro.atanasov@cern.ch>; Antonio Lafuente Mazuecos <antonio.lafuente@cern.ch>
> > > **Subject:** Re: Graphite/CFC Cu coating experience
> > >
> > > Dear Miroslav,
> > >
> > > in order to see if the RF-loop measurement can be of any help for you, I'd need to know the dimensions of your blocks and the material. If I correctly understood you have two blocks of copper coated graphite. What conductivities did you measure with Wil?
> > >
> > > Cheers,
> > >
> > > Nicolò
> > > On 01/14/2016 09:40 AM, Miroslav Georgiev Atanasov wrote:
> > >
> > > > Hello,
> > > > Well then let's try and do that. Nicolo, could you confirm that we can measure this on a slightly radioactive block (<0.1 uSv expected)? If so, could we agree on a date for the measurement. I'll take care of the RP business, if you could just let me know where I should bring the block.
> > > > Regards,
> > > > Miro
> > > >
> > > > ---
> > > >
> > > > **From:** Antonio Lafuente Mazuecos
> > > > **Sent:** 13 January 2016 11:13
> > > > **To:** Miroslav Georgiev Atanasov <miro.atanasov@cern.ch>
> > > > **Cc:** Nicolo Biancacci <Nicolo.Biancacci@cern.ch>

Subject: RE: Graphite/CFC Cu coating experience

Hi Miro!

Happy new year and thanks for following up. Wil did mention me something earlier this week. I agree with you in that the 4 point probe method is probably not the most suitable way of measuring electrical conductivity of thin films on electrically conductive substrates. We typically measure the impedance with a clever setup that the people from RF have come up with. Nicolo, in CC, has been doing this for us lately. It would be good to repeat these tests on your blocks. RP are normally okay with this as long as the necessary precautions are taken. Check with them but there is always a way. I know this well because I'm currently conducting the post-morten characterization campaign of some samples we irradiated in HiRadMat. And please let me know if I can be of any help. We are currently doing some trials with Cu coatings for the TCSPM prototype that will be installed next summer in the LHC so all this is very relevant to us. Depending on the results of these tests and activation levels (and assuming you haven't done so already) we can also maybe think on observing them in the electron microscope or doing XRD to try to better understand what has happened.

Cheers
Antonio

From: Miroslav Georgiev Atanasov
Sent: 13 January 2016 10:54
To: Antonio Lafuente Mazuecos <antonio.lafuente@cern.ch>
Subject: RE: Graphite/CFC Cu coating experience

Hello, happy new year and all the best.
We measured the resistivity of two graphite block last week – attached you'll find a very short report. One of the blocks was the problematic looking one, where we had fears that the copper might have sublimated during bad bakeout. We compared that to a much better looking one – taken from one of the spares, that has never been in the machine. Surprisingly the resistivity values are almost identical – we think we don't have enough sensitivity to be more precise with the measurements, but it seems that although oxidized, the surface is still a good conductor, which is good news. See the last comment in the report, where Wil proposes an RF impedance measurement to compare the two blocks. The problem however is that one of them is slightly radioactive (I'll confirm with RP), which will prevent us from performing that measurement. I'll follow this up and let you know of any further developments.
Cheers,
Miro

From: Miroslav Georgiev Atanasov
Sent: 25 November 2015 07:29
To: Antonio Lafuente Mazuecos <antonio.lafuente@cern.ch>
Subject: RE: Graphite/CFC Cu coating experience

HI,
I'm waiting for Will to call me back when he finds some time. I haven't forgotten you, and I will let you know.
Cheers,
Miro

From: Antonio Lafuente Mazuecos
Sent: 24 November 2015 21:33
To: Miroslav Georgiev Atanasov <miro.atanasov@cern.ch>
Subject: RE: Graphite/CFC Cu coating experience

HI Miroslav

Just wanted to follow up where you are on re-quantifying the impedance of the block after extracting them from the tunnel. Please let me know if you have any updates

Cheers
Antonio

From: Miroslav Georgiev Atanasov
Sent: 22 October 2015 14:50
To: Antonio Lafuente Mazuecos <antonio.lafuente@cern.ch>
Subject: RE: Graphite/CFC Cu coating experience

Hi,
Yes, I sent that one because it has a lot of details, and gives a good perspective into the procedure….. For the TCDQ/TCDS it was a flash of titanium to form an adhesive base for the main copper layer. The coating reports I quoted (EDMS 544938 and EDMS 1337884) give the procedure and the results.
You can also check EDMS 681373 and 341797 on the Ti coating for the TIDVG. For more details, you can ask Wil Vollenberg directly, however he's away this week. In the meantime we are about to dig out the old TCDQ blocks (removed from the machine in 2013) and have Wil do a resistance measurement to determine how much the coating has degraded (on that particular block I showed you). The reason for this degradation was badly executed bakeout – after discussions with VSC it was advised that the pressure is lower than 10^{-4} mbar at any given time during the bakeout.
Cheers,
Miro

From: Antonio Lafuente Mazuecos
Sent: 22 October 2015 14:03
To: Miroslav Georgiev Atanasov <miro.atanasov@cern.ch>
Subject: RE: Graphite/CFC Cu coating experience

Hi again Mirsolav

Sorry to keep getting back to you with more questions but I haven't had time to go through the report you attached to this email until now. I'm a bit confused now because this report seems to

be related to a different collimator (TIDVG) and a different coating (Ti). It is very interesting though because it is pretty much exactly what we would like to do for the new coating we are trying to qualify but I am not sure how it squares with what you told me about the TCDQ and the Copper coating. Did you do something similar for Copper? And also, the document sent looks like a draft. Do you know if there is a final version with an EDMS number?

Already thanks
Antonio

From: Miroslav Georgiev Atanasov
Sent: 28 September 2015 13:59
To: Antonio Lafuente Mazuecos <antonio.lafuente@cern.ch>
Subject: RE: Graphite/CFC Cu coating experience

Hello,

Thanks again for your interest in our experience. Before LS1 the TCDQ diluter used to be a fully graphite structure.Drawings lhctcdqa0014, 15, and 16 – now obsolete, show the blocks – note the way the blocks at each extremity of the vacuum tank are machined to improve the transition between the racetrack chamber and the inside of the absorber. The blocks were coated in 2005 by Wil Vollenberg (EDMS 544938).

For the new version we are using a sandwich of C/C and graphite, since the manufacturer could not produce C/C in 75 mm thickness. Hence only the C/C is coated – same technique (see EDMS 1337884). On picture 4969 you can see the graphite – C/C sandwich, and the beryllium copper contact springs that link electrically the copper beam screen to the blocks.

We had problems cleaning the blocks because the supplier had very diligently stuck labels onto them (pic.108), that were extremely difficult to remove – we used a lot of acetone, and we also had to sand them down a bit (on the picture you can see that removing the labels left a lot of glue on the surface). In fact we had to clean them twice (alcohol/acetone + CO_2 blasting), since we were worried that we might pollute the vacuum oven with traces of glue. So a tip for you – always request that the supplier doesn't put any sticky labels onto the blocks. We requested that, but the second batch of blocks arrived with ID numbers written directly on the blocks with a permanent marker (see attached)… Luckily that was easy to remove, but again, make sure you specify this when you order.

After this first cleaning stage we blasted them with CO_2 dry ice in 867/R-Y02 (responsible for the lab is Damien Grenier – see attached "summary of tests" for the qualification procedure). The attached video shows the blasting – quite noisy and dirty as a lot of carbon dust is flying around – you need gloves, respiratory mask, ear protection. The blocks are fixed onto the rotating table and all 6 surfaces are cleaned. A thing to remember – the CO_2 is produced and delivered on the day in a cold box (SCEM 60.04.15.501.1), and normally it can last up to 24 h. So the planning should take into account the availability of the room and the delivery times (see with Joelle Donche from the stores). As for the quantities required it depends on the setup of the machine, but we would normally buy, say 60-100 kg that is usually enough for a good day's cleaning.

After the blasting we wrapped them in Kraft paper and put them in plastic lock bags. The blocks were then treated in the vacuum oven in b.112 (A. Vacca at the time, I don't know who is in charge now). I'm not very familiar with the entire procedure, but as far as I know they do 2h at 600°C, and 2h at 1000°C

After the heat treatment the blocks were coated by Wil. We didn't do vacuum tests of the individual blocks, but rather we tested the entire diluter as built. An outgassing report for one of them can be found in EDMS 1310507. All the details from the assembly and the vacuum tests are in MTF, identifier HCTCDQ (look in the documents tab).

That's what I can think of for the time being, let me know if I've forgotten to mention something, and if you need more specific details.

Cheers,
Miro

From: Antonio Lafuente Mazuecos
Sent: 25 September 2015 15:07
To: Miroslav Georgiev Atanasov <miro.atanasov@cern.ch>
Subject: Graphite/CFC Cu coating experience

Hi Miroslav

As per our phone conversation, here a quick note with my contact details in case you want to send along any information you may consider relevant. As mentioned we are looking into ways of improving the impedance of the TCSPM jaw absorber material by sputtering an electrically conductive material on it. I was interested in any know-how you may have accumulated throughout your work in the TCDQ that could be relevant to us. Examples of this would be the impact of the surface prep + coating on the RGA or on the tolerances, the way you qualified the coating with the people from RF, etc…

Alreay thanks for your time!

Cheers
Antonio

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