14th St Com meeting, 30/01/2025

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WP9 coordinators

WP9 progress

- Task 9.1:
  - Coordination of all activities within WP9
  - Strategy:
    - D9.1 Report on Thin-Film SRF Roadmap written by IFAST WP leaders is considered as a 1st step towards widely recognised document. After submitting to EC, as a 2nd step it will be widely distributed within the TF SRF community for comments, suggestions and feedback.
    - Involvement and Coordinating the thin film SRF theme in Implementation of the Accelerator R&D Roadmap of the European Strategy for Particle Physics (ESPP).
- Task 9.2:
  - 1.3 GHz cavity production is in a progress at Piccoli, EB welding at JLab – agreement is in place
  - Deposition of 1.3 GHz cavity scheduled for
    - April at UKRI and June at INFN.
  - SRF test at HZB in July 2025
- Task 9.3:
  - Nb_3Sn target development continues at INFN
  - 30 new 6-GHz cavity produced at Piccoli and polished at INFN
  - Deposition and characterisation on small samples and 6-GHz cavity :
    - Nb and NbTiN at UKRI (next week) followed by RF test at INFN
    - Nb_3Sn at INFN
  - NbTiN deposition of planar samples at USI,
  - SIS deposition at UKRI and USI
  - 6-GHz split cavity disposition and RF testing at UKRI (in 2 weeks)
- Task 9.4: ALD (CEA)
  - Depositing by ALD and characterizing numerous Cu and Nb planar samples for Post deposition by sputtering or HIPIMS of Nb_3Sn or Nb.
  - Deposition by ALD of NbTiN multilayers with a new diffusion barrier on Nb samples. Future deposition on a cavity.
  - ALD deposition on eleven 1.3 GHz Cu and Nb cavities.
  - Tunneling spectroscopy measurements on Nb_3Sn, NbTiN, and multilayers samples.
  - Commissioning of a new facility for cavity coating.
  - Set up for RF tests at 6 GHz cavities under commissioning.
- Task 9.5:
  - Laser treatment at RTI
    - Laser irradiation facility is ready,
    - 2nd Nb coated 1.3 GHz cavity without flanges from INFN/UKRI arrived to RTU to be laser treated
    - RTU is awaiting for a Nb coated cavity with flanges from INFN/UKRI for laser treatment and for the following RF tests
  - Flash Lamp Annealing (HZDR+INFN)
    - first try of Nb film on Cu,
    - 6 GHz cavity - ??
- Task 9.6:
  - QPR at HZB:
    - QPR facility is operating. 4 tests hare have been performed with QPR samples from CEA, INFN, UKRI and USI.
    - The ALD-QPR from CEA was replaced by a bronze-route Nb_3Sn sample prepared at HZB
  - EXP900 at UKRI:
    - Facility is testing for planar samples at 7.8 GHz

Milestones and Deliverables

All milestones achieved and reported

IFAST WP9 Deliverables	Delay justification	
D9.1: Thin-Film SRF roadmap report. Summaries of the results obtained within the workpackage and prospective inspired from WP advances as well as discussions at TF-SRF 2022.	***Report submitted***	~~M35~~ **M45**
D9.2: RF test on coated resonant cavity. Resonant cavity coated and tested with an alternative material to Niobium with a $Q_0 > 10^9$ at 4.2 K and 1.3 GHz.	▪ Direct coating on Cu not possible. Need Nb Bulk-type substrate to achieve nominal T_c of Nb_3Sn (thick Nb buffer layer on Cu cavity, or Bulk Nb cavity). ▪ In house production of Nb_3Sn targets for sputtering is more challenging than expected. Deposition set-ups at STFC and INFN had to be redesigned in order to use planar commercial targets. ▪ Long procurement process for OFE Cu disks (for Cu Cavity production) ▪ New design of the cavity flanges required for high temperature coating process	~~M46~~ ~~**M50**~~ **M53**
D9.3: First 6 GHz cavity coated and characterised. Results from the morphological and SC characterisation of first coated cavity with an alternative material to Niobium.	▪ Technological problems: delamination of NbTiN form 6 GHz cavities ▪ A few possible causes of the problem being investigated ▪ Waiting for two 6 GHz cavities to coat at UKRI ▪ Low power testing facility is being built at UKRI	~~M36~~ **M50**
D9.4: Deposition of superconducting multilayers on cavities. 1.3 and 3 GHz Nb and Cu cavities coated and tested with multilayers.	*Report to be submitted by end of Jan 2025*	M46
D9.5: 1.3 GHz Nb-coated cavity irradiated by laser in Ar atmosphere and RF tested. Increasing of the field of magnetic flux entry in Nb coated 1.3 GHz cavity irradiated by laser in argon atmosphere. Standard RF testing.	▪ **Awaiting for partners to provide a Nb coated 1.3 GHz copper cavity** ▪ copper cavity to be produced at INFN ▪ Then coated coated at INFN or UKRI, and RF tested. ▪ Then sent to RTU for laser treatment, then RF tested again	~~M46~~ **M51**
D9.6: Test of thin-film samples. Four thin film samples reprocessed by 4 different techniques and tested with QPR.	*Report to be submitted by end of Jan 2025*	**M46**

Task 10.5: PSD from NEG coated accelerator vacuum chambers

(UKRI, DESY, DLS, Soleil). Task Leader: O. Malyshev (UKRI)

- Milestone and Delivery report have been completed and submitted
- Task 10.5 meeting take place every 2 months.
- Both SR beamlines at DLS and Soleil are in operation, tests with NEG coated samples are ongoing.
- Second series of samples NEG coated at UKRI will be installed at spring shutdowns on both DLS and Soleil beamlines.
- Exchange of copper samples for pumping tests is continues between 4 partners: DESY, DLS, Soleil and UKRI.
- The partners are interested in continuing this collaboration beyond IFAST.

Annual meeting

WP9:

- Two talks:
  1. A join talk of two junior scientists from INFN and UKRI on PVD deposition and RF measurements
  2. An ALD talk from CEA

Task 10.5:

- 1 talk
- Speaker: Eleni Marshall