Preparation and Conditioning of the TTF VUV-FEL Power Couplers

Hassem Jenchani
Laboratoire de l'Accélérateur Linéaire
DESY (DESY) et Université Paris-Sud
Centre de Saclay, Dép. DCF 91,Bât. 290, CEA
91680 Gif-sur-Yvette Cedex (France)

Introduction

The current TTF-III coupler design has been adopted for the superconducting accelerator XFEL since 2003. This coupler model may also be a good candidate for the ILC project. In the framework of DESY-LAL collaboration, 40 TTF-III couplers have to be room temperature processed at Cryos. Analysis of the couplers behavior may lead to an optimization of the conditioning procedure.

TTF-III Coupler

In the class 1000 clean room:
- Clean all coupler parts in the ultrasonic bath at 60°C using the Tiskopur R13 detergent.
- Rinse them with ultra pure water until the resistivity of the draining water becomes higher than 14 Mohm.cm

In the class 10 room:
- Let the all wired elements dry for sufficient time
- Blow these parts with filtered ionized nitrogen at a pressure of 4bar (for the cold parts and transition only) using a particle counter with must count less than 10 particles of 0.3 microns per cubic foot. If not parts must return to the ultrasonic bath.
- Put all the parts in oven and bake them at 150°C for 35 to 40 hours.
- Leak test using helium gas.

Effect of conditioning on e-current

Conditioning acts on coupler surfaces causing a reduction of the SEE. This permits a progressive decrease of the e-currents during the coupler process.

Conditioning Summary

Averages done on 7 coupler pairs shows that one can save more than 1/2 of the conditioning time by baking.

Conclusion

- Best conditioning time performances for TTF-III were from 45 to 50 h (Minimum conditioning time is 15h 30 when there are no events).
- Reducing the conditioning time may be possible by accelerating the RF power rise during the safe power region. Reducing the preliminary vacuum limits can also be an alternative solution.
- 150°C in-situ baking saved more than 1/2 of the conditioning time and allows one to reach better vacuum in couplers.
- Two new coupler prototypes that could be alternatives to TTF-III for the ILC project will be manufactured soon.