

Title:	<i>“Optimization of Surface Roughness of Anti-Multipactor Coatings for Low Insertion Losses and Secondary Emission Suppression for High Power RF Components in Satellite Systems “</i>		
Contract type	<i>ITI</i>	Budget (K€)	150
Company (-ies) (including country)	Tesat Spacecom (Germany) (prime), Instituto de Ciencia de Materiales de Madrid CSIC (Spain), Universidad Autónoma de Madrid UAM (Spain)		
Team (name of the participant in the project)	ESA: David Raboso TESAT:Meinrad Abele, Ulrich Wochner CSIC:Isabel Montero, Lydya Aguilera. UAM: Luis Galán, Valentín Nistor, Luis A. González.		
(* Speaker (s))	Luis Galán Email: luis.galan@uam.es Isabel Montero Email: imontero@icmm.csic.es Ulrich Wochner Email: Ulrich.wochner@tesat.de		
Short Speaker Information (experience and involvement in this project)	<p>Luis Galán: Professor of Applied Physics Department, UAM (Spain) Scientific leader of more than 5 projects with ESA since 1985 on SEY and Multipactor. Leader of UAM team in the project.</p> <p>Isabel Montero: Research Professor of CSIC.(Spain) Scientific leader of more than 40 projects of the Spanish Government, ESA and different European companies. Leader of CSIC team in the project.</p> <p>Ulrich Wochner: (...)</p>		

Summary of the activity
(maximum 400 words)

The objective of this ITI project was to enhance Multipactor threshold without penalizing insertion loss on Ag-plated harmonic low-pass corrugated filters, see Fig.1, by optimizing surface roughness shape and size. Filters were designed and manufactured by Tesat.

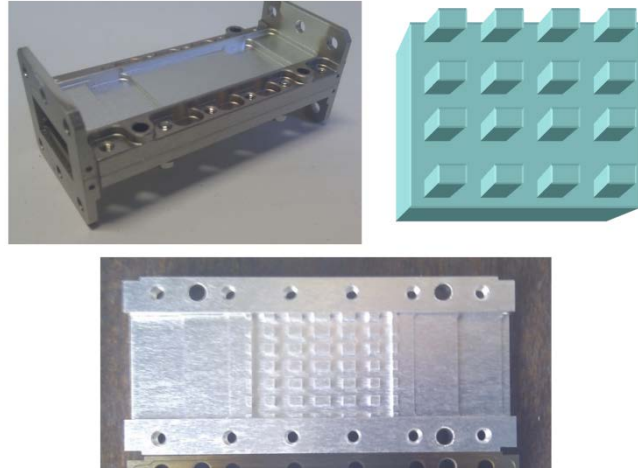


Figure 1. **Structure of the Ku-band Filters.** From top to bottom and from left to right; filter assembled after treatment; schematic structure of poles or pillars in the center of the filter; filter half shell with as-received Ag plating.

Several technical strategies were envisaged in the project proposal and then studied in the phase 1 of the project. Two most reliable, a physical technique based on ion beams and sputtering and a chemical one based on chemical deposition reactions, were selected.

Two techniques were developed: Sputtering and Chemical Method

Sputtering: Ar ion etching of the Ag plating assisted by sputtering deposition of Ti and subsequent Au metallization.

Multipactor threshold enhancement: from 2.9 to 14.8 kW

Insertion loss: from 0.04 to 0.05 dB

Surface:

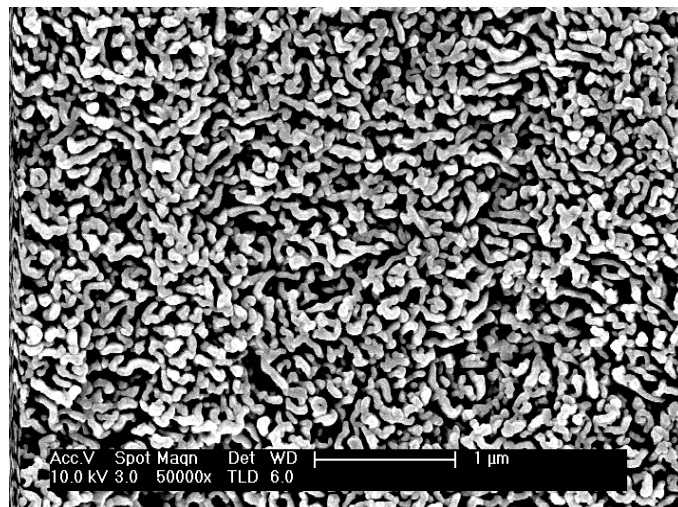


Figure 2. **SEM image of the filter surface after the sputtering treatment.**

Chemical Method: Chemical etching and subsequent electroless autocatalytic chemical deposition of Ag from electrolyte in aqueous solution over the Ag plating (Fig.3).

Multipactor threshold enhancement:

No discharge with maximum power available

Maximum power available: 15 kW

Insertion loss: from 0.04 to 0.06 dB

Surface:

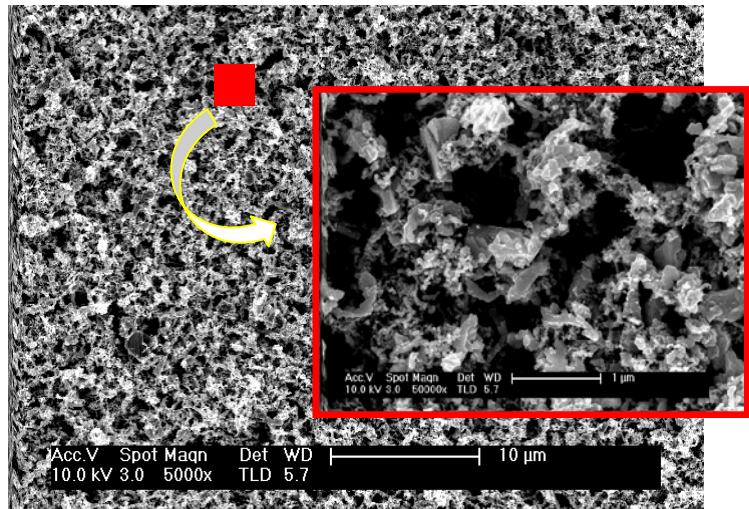


Figure 3. SEM image of the filter surface after the chemical treatment.

This Chemical Method has been patented.

(*) The speaker needs to do the registration through the [website](#)