

STARTEF

STORY

STARTEF is an Italian **Startup** born in 2016 with the aim of developing **innovative nanotechnological** solutions and **alternative energy** solutions.

Actually, Startef operates as a **knowledge society** who creates innovative concepts at **high added value** and manages projects with the collaboration of other enterprises, universities and research institutes. We also operate in project financing sector and in specialized scientific training.

STARTEF aims to industrialize the patented EDT system – Energy from Thermal Differential, outcome of years of research and tests.

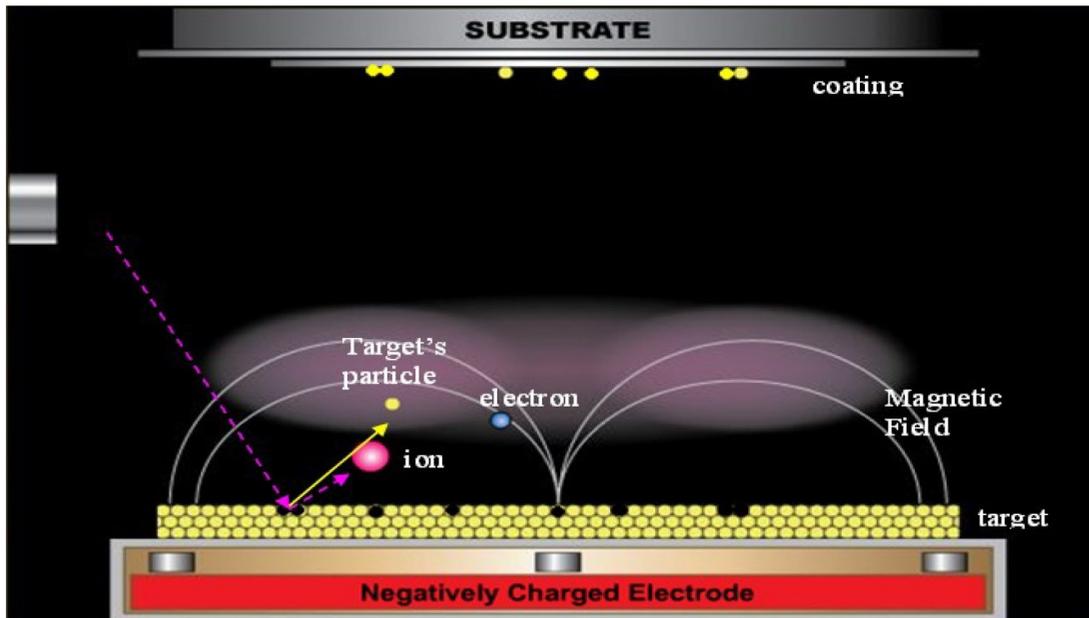


ENERGY FROM THERMAL DIFFERENTIAL

- Carbon-based **nanocoating** (from 200 to 1800 nm).
- **Transparent** at visible light between 380-750 nm.
- It fits any kind of surface and **doesn't degrade**.
- High thermal conductivity (**1570 W/mK**) and low electrical conductivity.
- Mechanical stress measured varying from 1.35 to 5.2 GPa

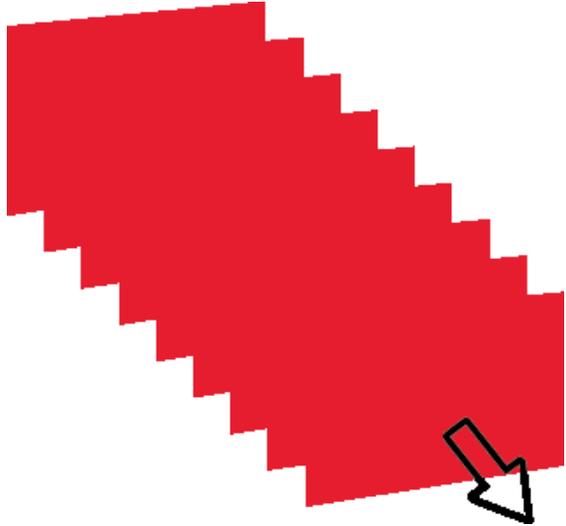


ENERGY FROM THERMAL DIFFERENTIAL



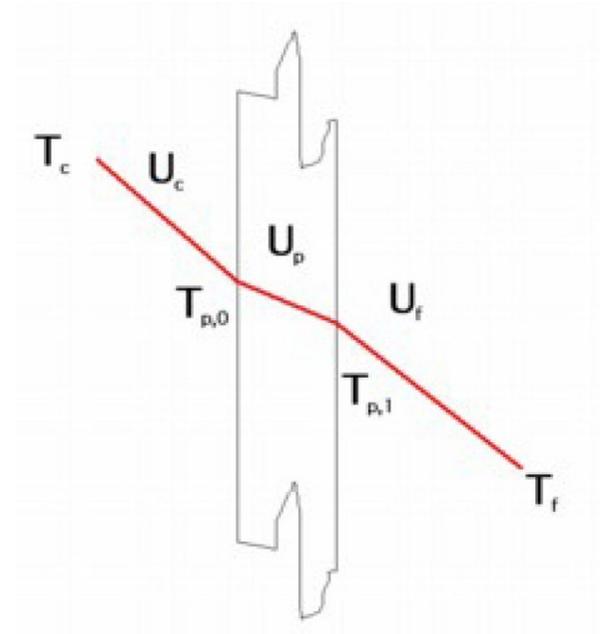
The entire process requires a **UHV machine**, sputtering system and a magnetron with precise parameters such as magnetic field, pressure, temperature and bias voltage to reach the correct percentage of **sp³ bonds** that makes the difference.

HEAT PROPERTIES



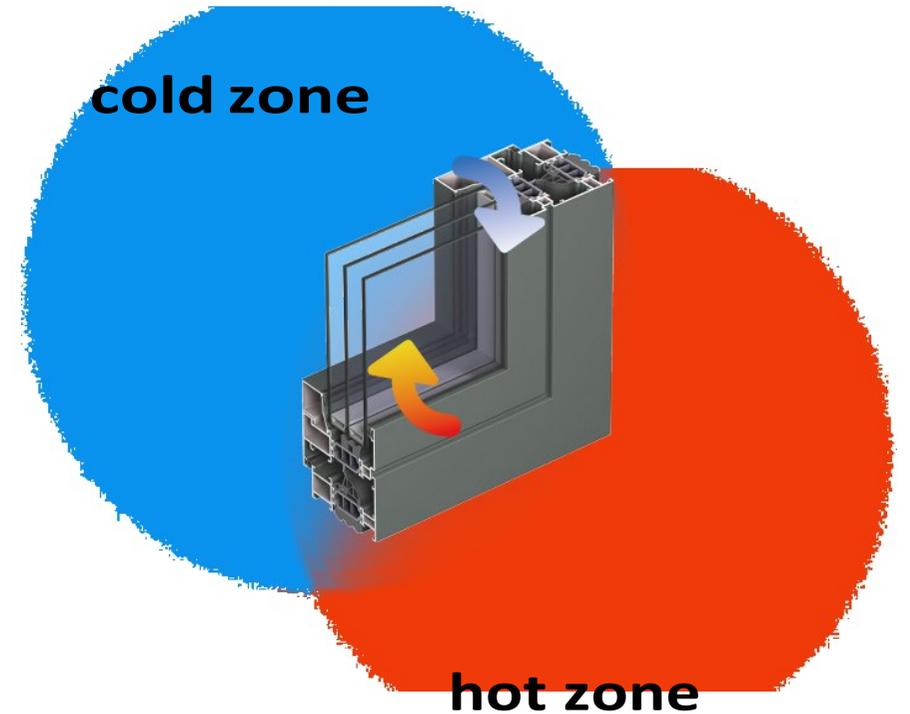
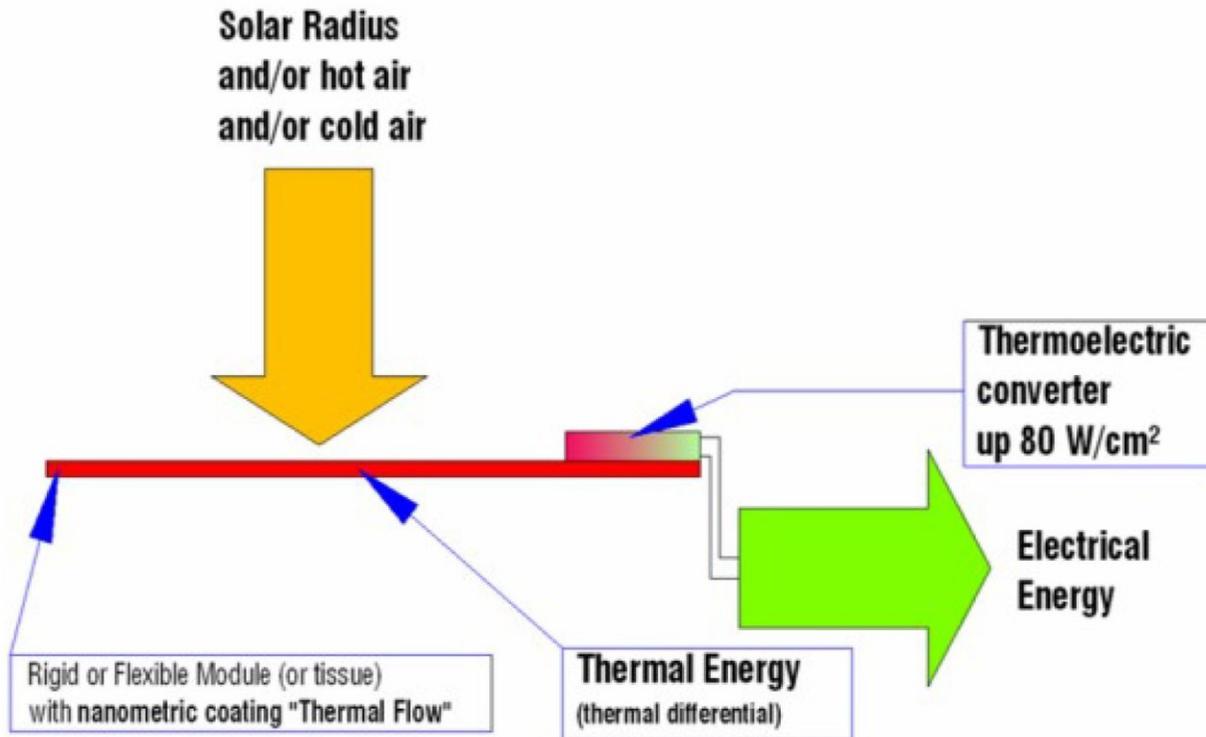
In equilibrium, heat propagates in waves from an hotter source to a colder one.

In this way, temperature crossing a medium should drop down in a linear way, with a defined slope.





ENERGY FROM THERMAL DIFFERENTIAL



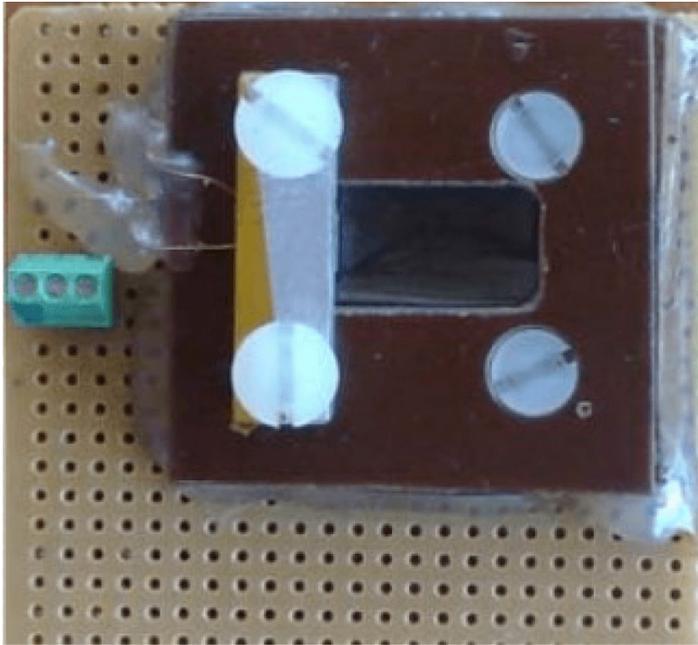
EDT POWER

ΔT (°C)	Energy Power Produced (W)
50	4000
40	2700
30	1150
10	550
5	300

The table shows energy production at different thermal gradient measured during laboratory tests, normalized to a dimension of 1 sqm.



ENERGY FROM THERMAL DIFFERENTIAL



Prototype of 10 mm x 10mm produces 0,48 W with a $\Delta T=50^{\circ}\text{C}$ between inside and outside the coating.

- 10 sqm covered with EDT can produce **3kW with a $\Delta T=5^{\circ}\text{C}$** , both day and night.
- The conversion **efficiency** is about 40%.
- EDT resists to thermal gradient over 250°C .

SMART WINDOWS



- The best way is applying EDT nanocoating on the external surface since its low density of micro-holes protects the window and makes it exempt from external agents.
- **Neither maintenance not cleaning are needed.**

SMART WINDOWS



- EDT may be applied on flat glass in modern buildings to ensure **thermal insulation** due to its special property to intercept the heat entering the building and the one outgoing, converting it in **electric energy**.
- EDT assures an additional protection to the surface where it is applied.

SMART WINDOWS

- Applying EDT on the external surface of a vehicle windows makes possible to intercept the heat going inside or outside and convert it to electric energy **useful for batteries.**

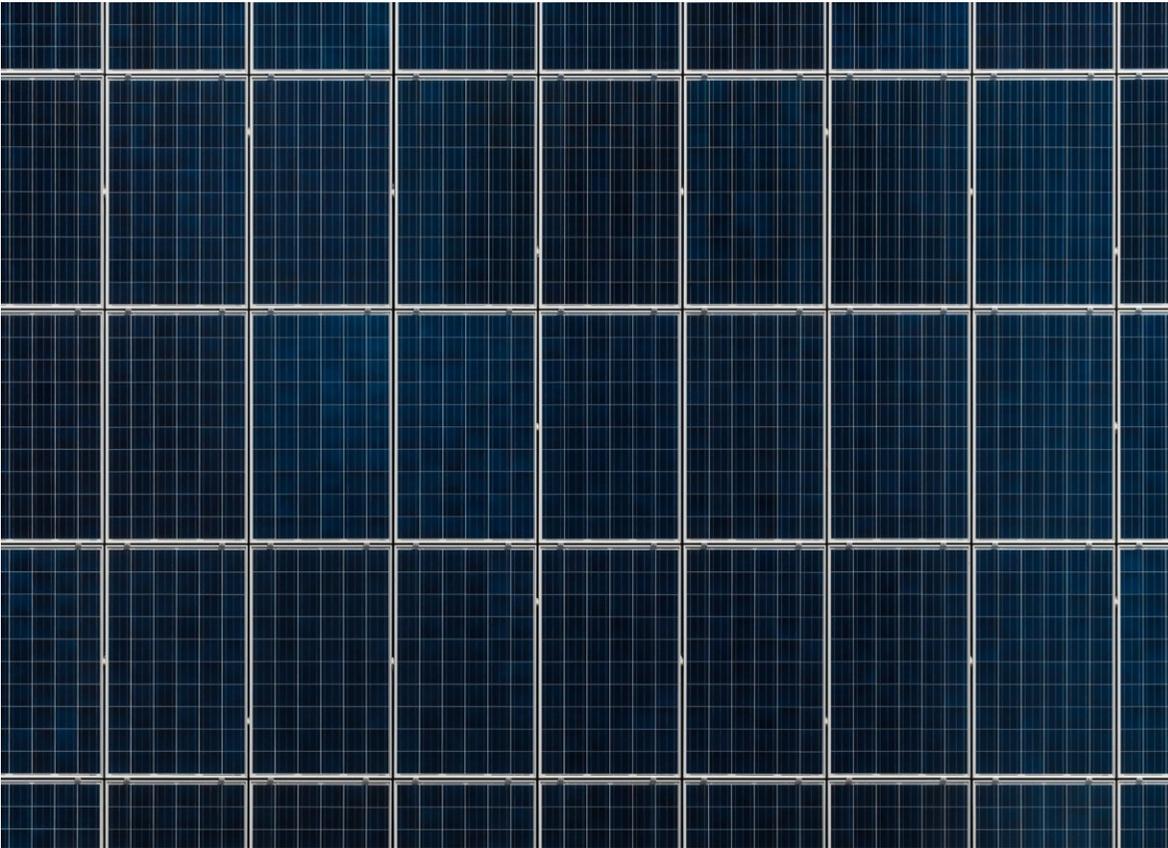


SMART WINDOWS & GREENHOUSES

- Due to its **low electrical conductivity** it is **safe** in indoor application such as windows and any kind of touchable surfaces.
- EDT may be integrated in a home automation system and used as an alarm system in case of touch.
- Cover greenhouse's windows with our EDT nanocoating would guarantee energetic self-sufficiency in any conditions.

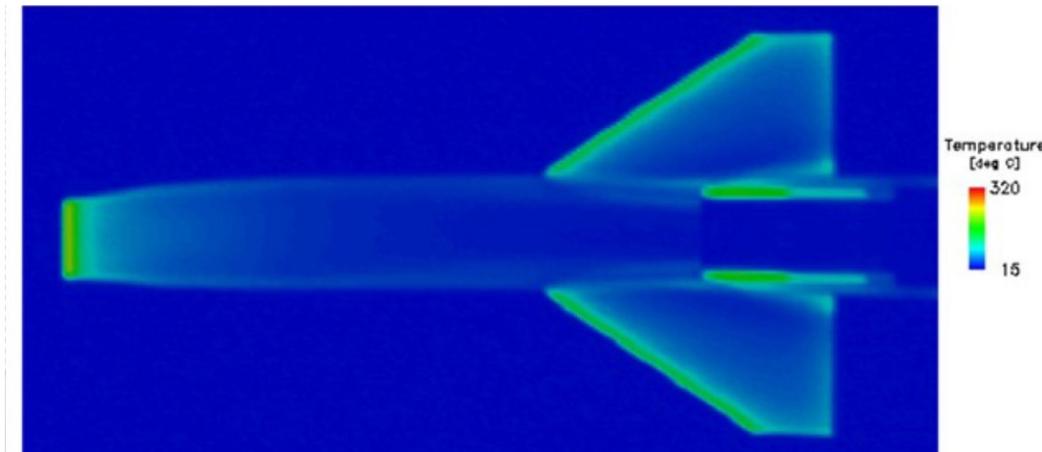


PV SYNERGY



- It is well known that PV cells **lose efficiency** with increasing of temperature.
- Applying EDT under the PV panels functions as a cooler for the cells bringing the **efficiency** to **30%**.
- The heat extracted from the solar cells is converted by EDT to a further electric energy.

AVIATION



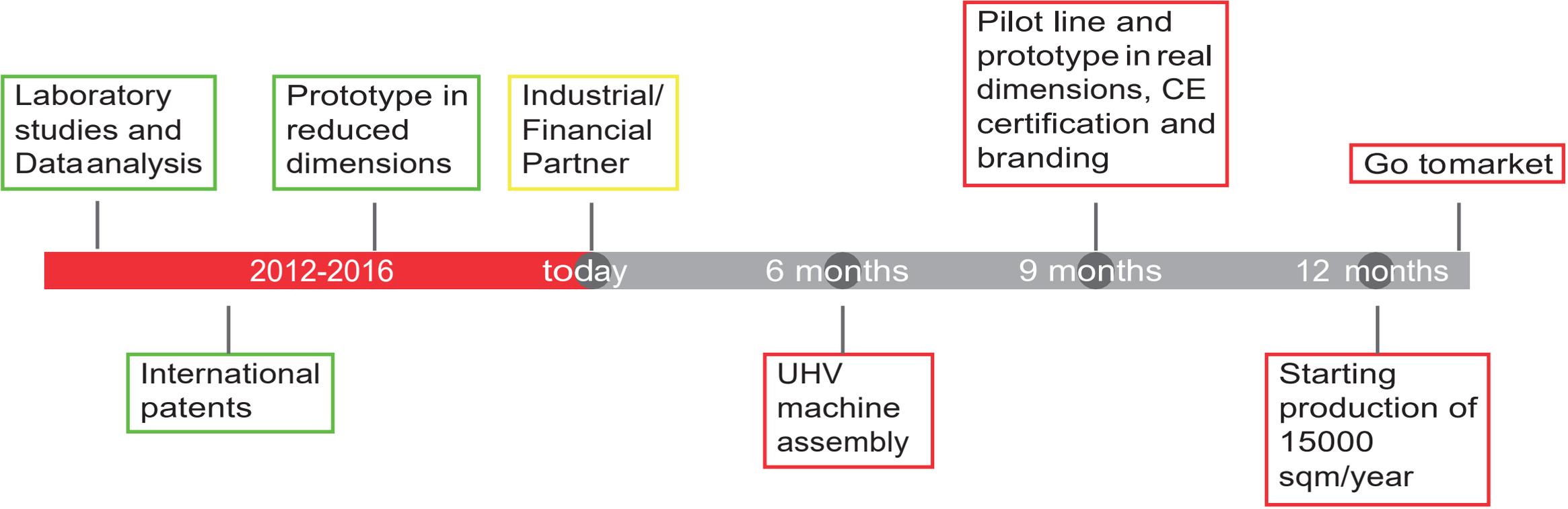
- During a flight the leading edge of a **Eurofighter Typhoon** may reach temperatures of about 130°C flying at Mach 2.
- Covering these hotspots with EDT may easily cool them and produces instantly **energy supply**.

AVIATION



Besides producing energy, extracting heat from the surface **decreases IR radiation** due to thermal activity.

ROAD MAP



TEAM



Angelo Tavella

27, degree in Material Physics at Sapienza University in Rome, with studies in low dimensional systems, scientific representative of the EDT project.



Cristian Tavella

25, degree in Economy at Sapienza University in Rome, completed his studies with a master in Business and Management.



Franco Sintoni

Degree in Nuclear Engineering, expert in coating technologies, tribology and functional materials, CEPA Representative³ of WEAG (now European Defense Agency). ACARE Platform Member.



Elis Mantovani

65, degree in Engineering, with a thirty year experience in micromechanics and microelectronics companies.

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Thank you for your attention