Silicon Carbide (SiC) dosimeter for gamma and conventional radiotherapy

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Pillar Health – Spoke 5/WP 4

SAMOTHRACE 2nd Year:
Experimental Prototypes Demo Showcase

SAMOTHRACE PROJECT ECS00000022

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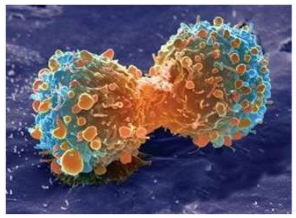
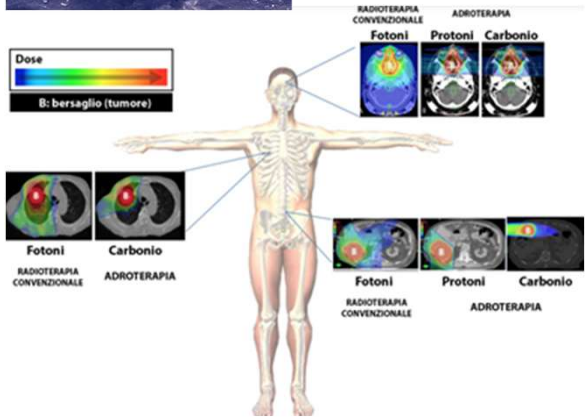
Italiadomani PIANO NAZIONALE DI RIPRESA E RESILIENZA

Silicon Carbide (SiC) dosimeter



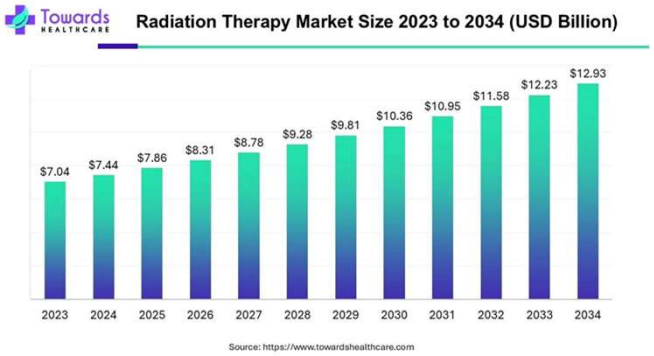
- Hadrontherapy
- Diagnostics: dosimetry



THE PROBLEM TO BE SOLVED

Flash diamond detector

https://www.ptwdosimetry.com/en/radiation-therapy/categories/detectors



- Tissue equivalence
- Dose-independence
- Accuracy and Sensitivity
- Cheaper solutions
- Wearable dosimeters

The problem: cancer treatment → Target: from research to patients → Global market and challenges

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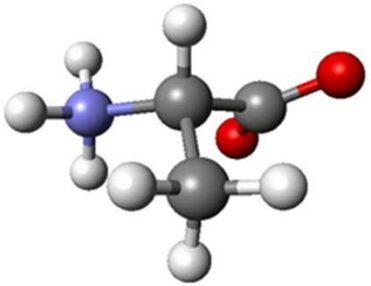
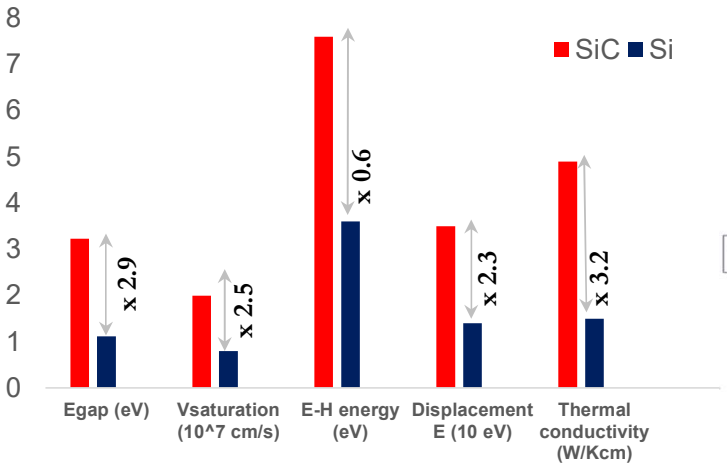
The solution→ SiC as dosimeter

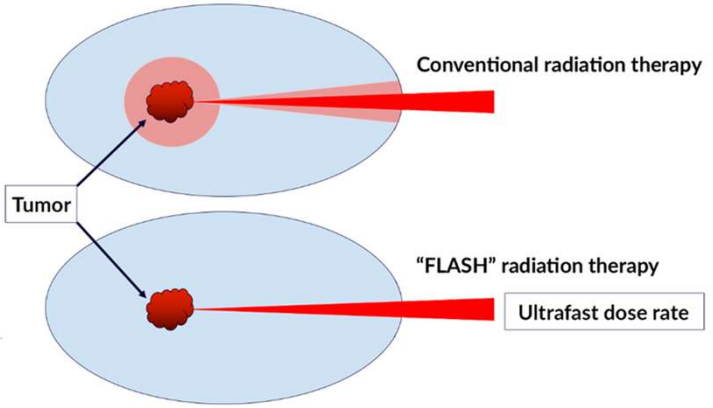
Active detector → provide real time dose measurement much faster and sure than alanine passive detectors



Advantages with respect to Diamond and Silicon dosimeter



FLASH radiotherapy: a promising cancer treatment modality under development



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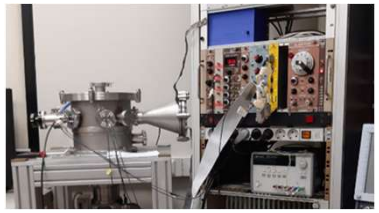
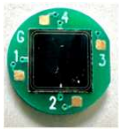
DEVELOPMENT PLAN UNDER SAMOTHRACE ECOSYSTEM:

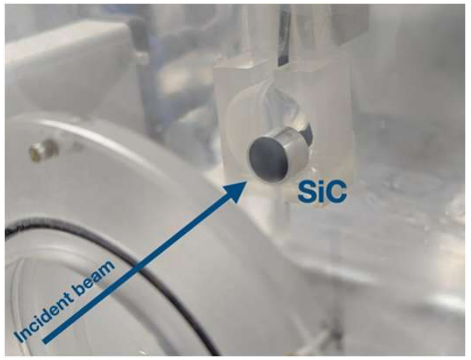
3 different partners in sinergy: INFN (CT, LNS), UNICT, UNIPA



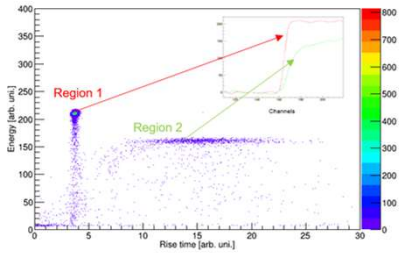


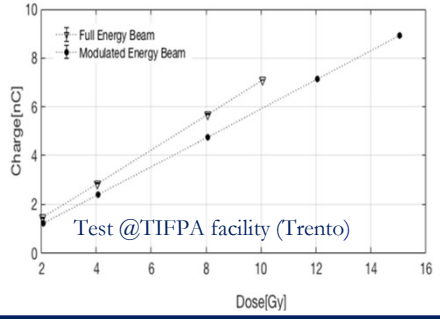
The SiC 25 mm^2-10 µm prototype

Irradiation field: 5mm in diameter
Energy: 250 MeV proton beam
Monochromatic beam
Beam Current: 10^6-10^8 p/cm^2



The encapsulated dosimeter positioned inside the water phantom enables accurate dose distribution measurements





Starting point: TRL 2
Characterization, simulations, tests

Current point: TRL 4
Engineering work for the encapsulation and resin coating of the prototype

Next future: TRL 6
assess the dosimeter's performance in clinical approach

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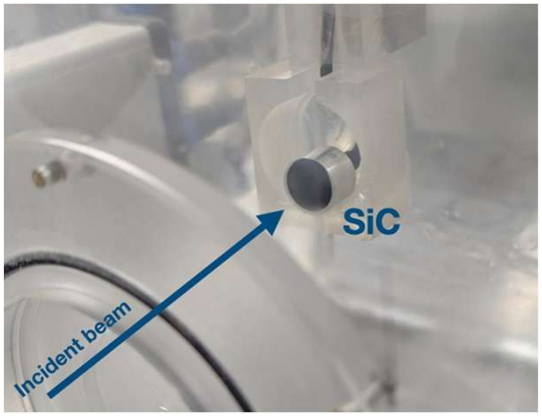
NEXT STEP UNDER SAMOTHRACE ECOSYSTEM

Next future: the dosimeter assessment performance

- ✔ **Dose measurements with X ray**
- ✔ **Dose measurements with charged particles**
- ✔ **Comparison with standard alanine detector**



TRL@t_0	Current TRL	Final TRL
2	4	6

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THANK YOU

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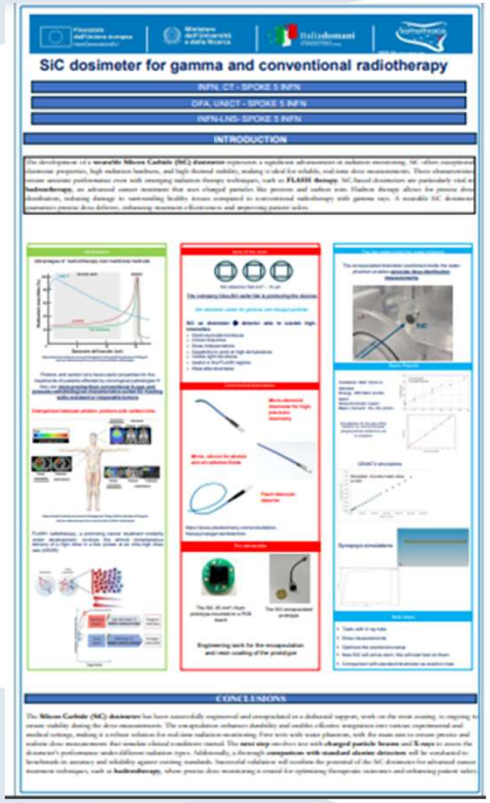

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