EuMW2018 PASSION FOR MICROWAVES

48TH EUROPEAN MICROWAVE CONFERENCE 2018

The 48th European Microwave Conference

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Push-Pull Configuration of High Power MOSFETs for Generation of Nanosecond Pulses for Electropermeabilization of Cancer Stem Cells

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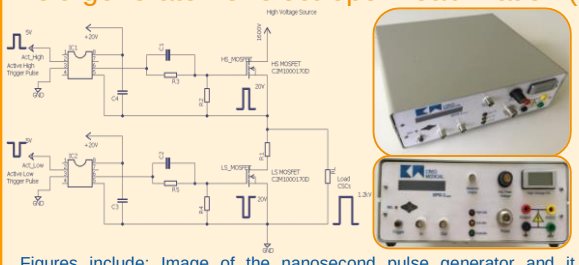
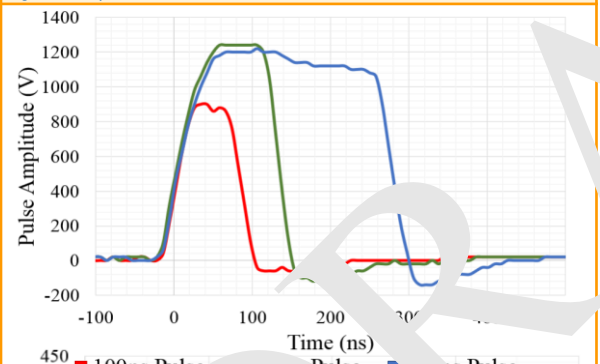
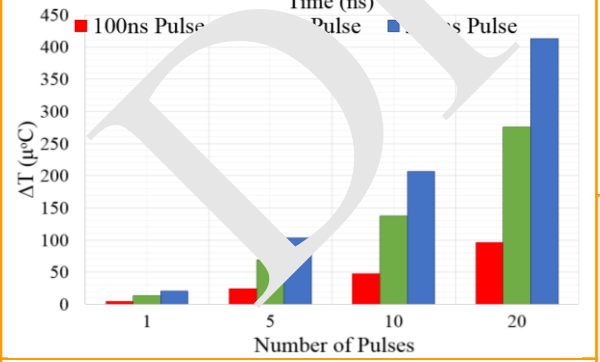
Introduction: Develop a high voltage (1kV+), 100ns-300ns nanosecond pulsed electric field generator for electropermeabilization (neutralization) of Cancer Stem Cells (CSCs)

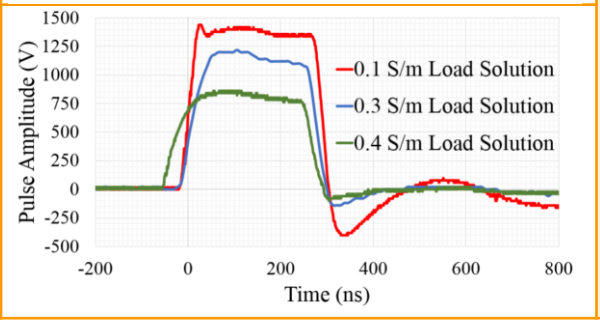


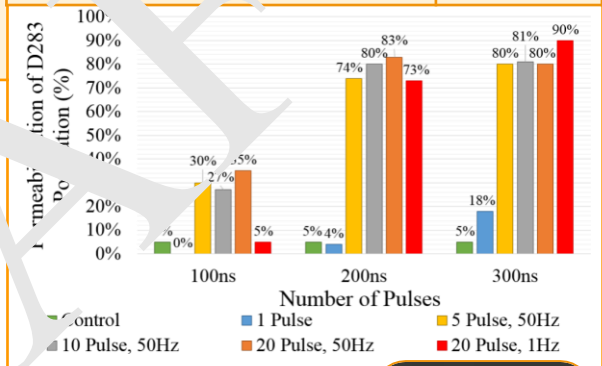
Figures include: Image of the nanosecond pulse generator and it modular design. Measured pulses on CSCs, non-thermal effect calculation and permeabilization results from CSCs exposure to generator pulse electric field

Parameter	Range
Repetition Frequency	1Hz – 50Hz
Pulse Width	80ns -1µs
Number of pulses generated successively	1 -1000 and Continuous
Pulse Amplitude	280V-1400V

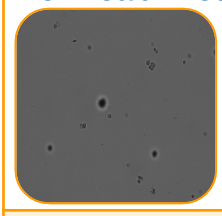


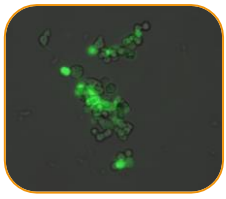






Permeabilized CSC → 90%





0% ← Unpermeabilized CSC

Conclusions

- Generate a **symmetrical pulses** (t_r=t_f) of various pulse widths and amplitude in excess of **1kV.**
- With **minimal overshoot and ringing**
- **Performance exceeds simulation**
- **Non-thermal** effect.
- **Irreversibly permeabilise 80 % of D283. Cancer Stem Cells population** with 5 or more of 300ns pulses.
- A **versatile generator is developed** with large range of pulse parameters to be selected.

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Sumcastec ENEA PRIFYSGOL BANGOR UNIVERSITY CREO MEDICAL European Commission Horizon 2020 European Union funding for Research & Innovation

Acknowledgments: European Union's Horizon 2020, SUMCASTEC project grant agreement No.737164 and ENEA (Italy) for cell culturing and microscopy. **More information visit:** www.sumcastec.eu