

# SUB-MICROSECOND RISE TIME MAGNETIC FIELD PULSER FOR BIOLOGICAL MAGNETOTRANSFER EXPERIMENTS

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The emerging contactless cell membrane permeabilization methodology (magnetoporation), which is based on high pulsed magnetic field (PMF) is highly dependent on the applied pulse parameters. In order to trigger PMF induced cell permeabilization, magnetic field in the range of 3-6 T and the induced electric field in the range of 5-10 V/cm are required [1,2]. As a result, high  $dB/dt$  systems are advantageous [3,4].

In this work, a high  $dB/dt$  generator, which is applicable for magnetoporation or study of the biological effects of PMF has been developed and is presented. The generator is based on an ignitron switch (20 kV, up to 100 kA) and an array of silicon controlled rectifiers (SCR). The SCRs, as the main pulse forming switches (typical in PMF generation technology) are no longer suitable for the task due to the  $dI/dt$  and  $dV/dt$  ratings of the setup, therefore, ignitron is used for the output pulse forming.

The photograph of the generator and the output waveform are shown in Fig. 1.

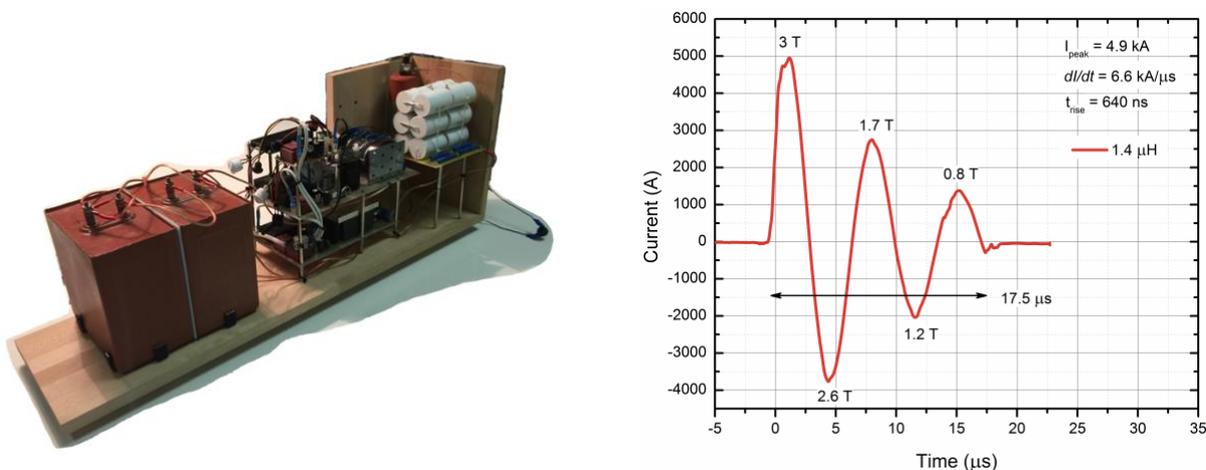


Fig. 1. The photo of the generator and the output waveform

The ignitron switch due its superb current handling capability allowed using both the nearly short-circuit and highly inductive loads. To present the concept we have used merely 5% of the current handling capability of the generator. The structure, the waveforms and the step by step development process will be presented in the conference, while the results may find direct application as a platform for basic magnetoporation experiments.

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