

Si nanowires for delta rhythm generator



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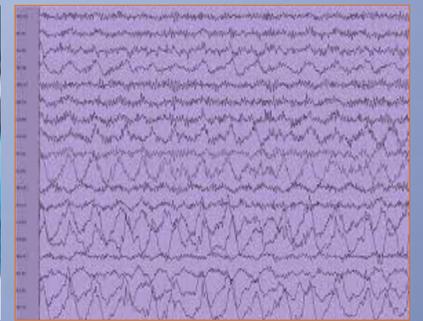
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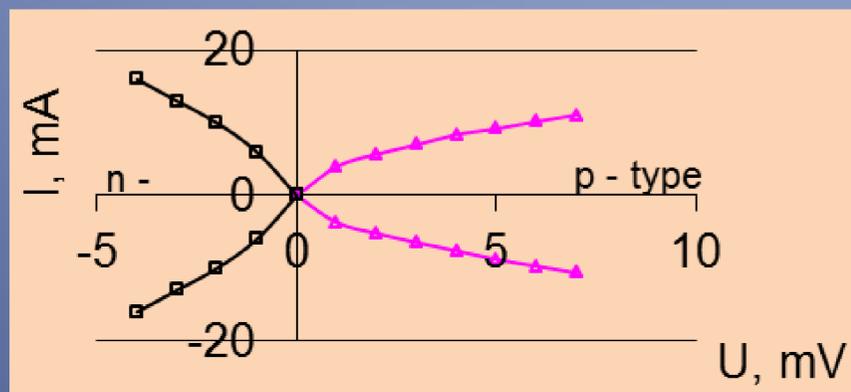
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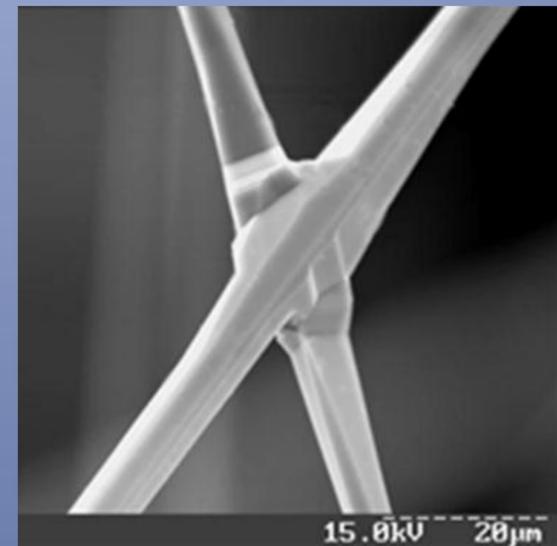
Introduction. Delta rhythms are low frequency (0.5-4 Hz) high-amplitude waves of the brain human activity, which are dominant during sleeping. The investigations of [1] supported fascinating hypothesis that brain responses synchronized by the slow oscillation restore microwake-like activity patterns that facilitate neuronal interactions. Besides, high amplitude delta rhythms are observed at the period of wakefulness in the people with mental disabilities that could be explained by compensatory abilities of human body to suppress disordered high frequency waves.



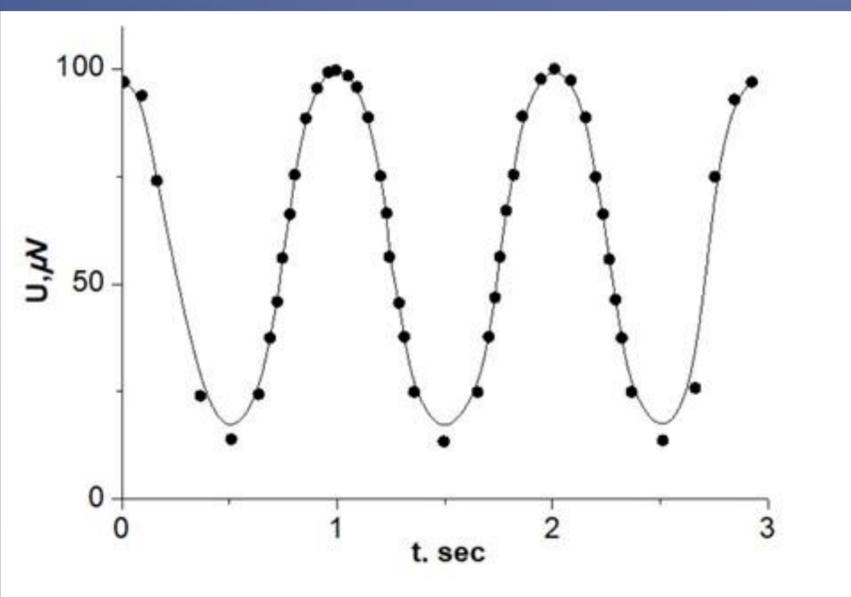
Objective. The present paper deals with design of low frequent generator of delta rhythms based on Si nanowire.



U-I characteristics of Si "X"- type joints: triangles – p-type of conductance; squares – n-type of conductance



Si wire joints were obtained by crystallization from the gas phase through the liquid phase due to VLS mechanism. The wire diameter was about 50-100 nm.



The measurement of U-I characteristics of Si nanowire joint were unexpected. When the current through the nanowire exceeds 10 μA the periodic oscillations of voltage arises. The period of oscillations is about 1 sec.

Conclusions

Simple design in the form of a cross-shaped growth of silicon wires allows to simulate delta rhythms when applied to the human head and to achieve a therapeutic effect.

The possible use of the developed generator:

- a brain generates delta rhythms in children with autism spectrum disorder (ASD) at the wakefulness state. However, in some case, for example, antisocial behavior in classroom, hysterics at working place, etc., delta rhythms need to be strengthened. This could be realized by interference of intrinsic and external delta rhythms obtained from generator;
- calming down at hysterics the soldiers who returned from the anti-terrorist operation zone.



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