Buryat State University
Medical Institute

Antibacterial properties of cold argon plasma

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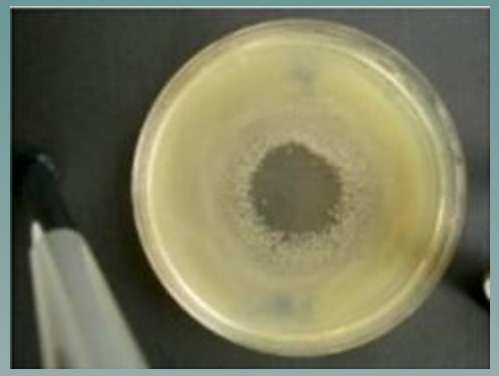
Plasma medicine: sterilization and improving wound healing

Plasma treatment of a patient during clinical trial

A cooperation of:
Max Planck Institute for Extraterrestrial Physics
ADTEC Plasma Technology Co. Ltd.
Max Planck Institute for Biochemistry
Department of Dermatology, Hospital Munich Schwabing
Department of Dermatology, Hospital Regensburg

Hospital set-up for plasma treatment: the MicroPlaSter

Second generation hospital set-up: the MicroPlaSter ß



Effect of treatment on bacteria

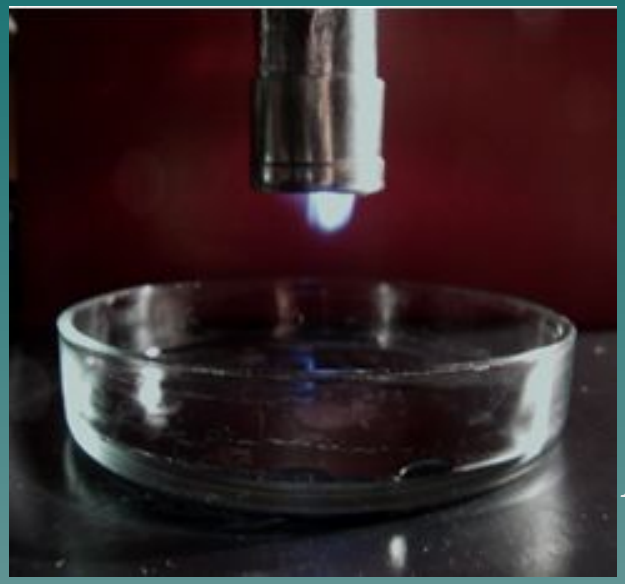
The purpose of study:

to research the influence of nonequlibrium cold argon plasma on Escherichia coli and natural association of microorganisms

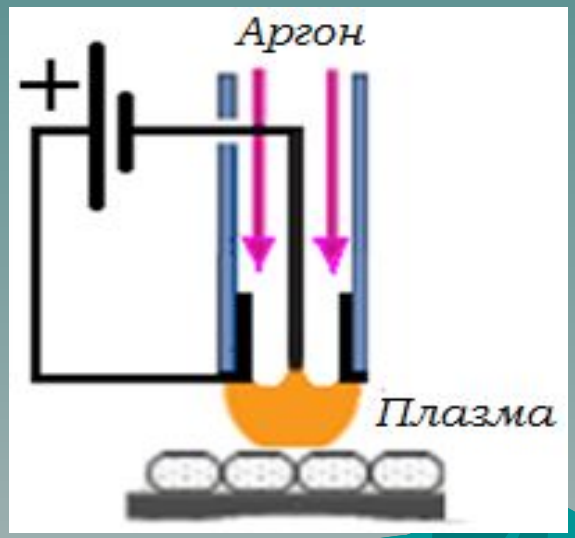
The objectives:

1. To analyze microorganisms` sensitivity to the treatment by means of cold argon plasma;
2. To identify optimum condition for microorganisms` inactivation.

The generator of cold non-equilibrium argon plasma

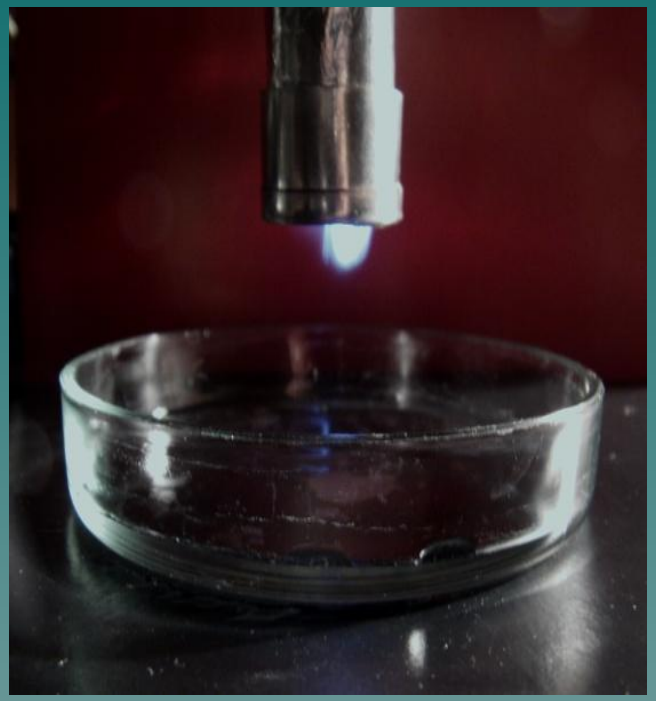


Electrode structure



The source of cold argon plasma based on jets glow discharge of atmospheric pressure

Institute of physical materials SB RAMS

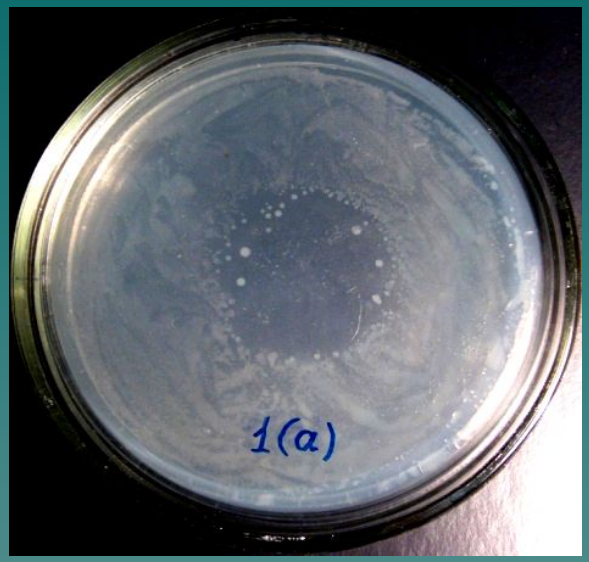


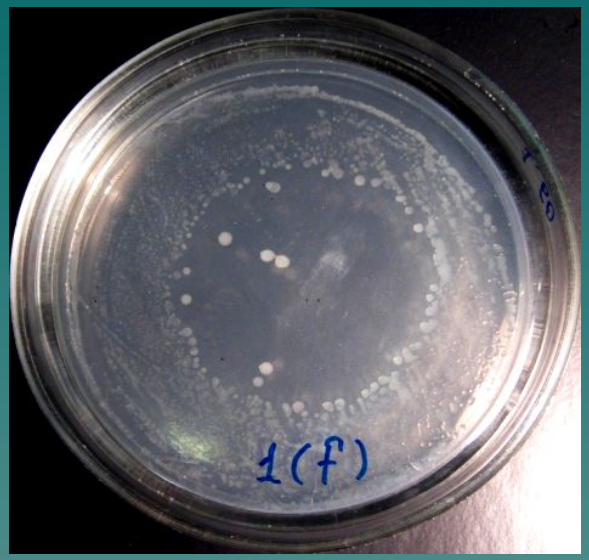
Cold argon plasma generator based on plasmatic jets of glow discharge in atmospheric pressure a – inactivation of microorganisms in the Petrie dish. b – end view of discharge.

The objects of study:

- Vegetative form of *Escherichia coli* (strain M17)
- Natural association of microorganisms

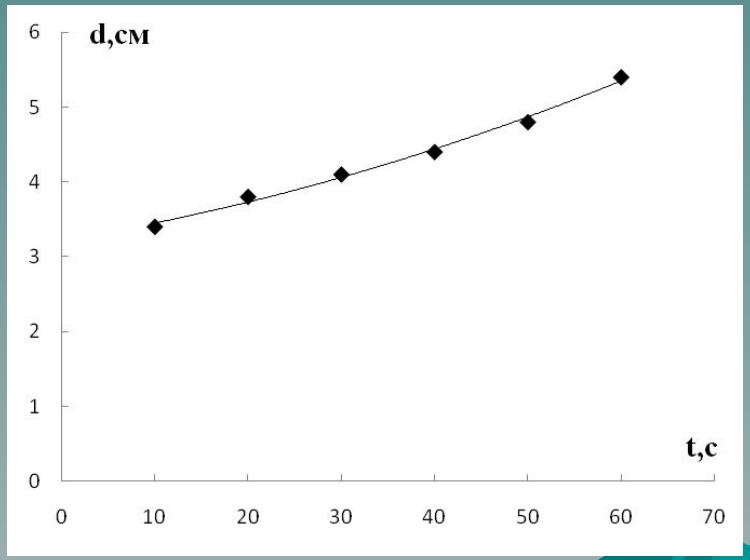
Inactivation`s zones of bacterial growth natural association of microorganisms caused by plasma`s influence



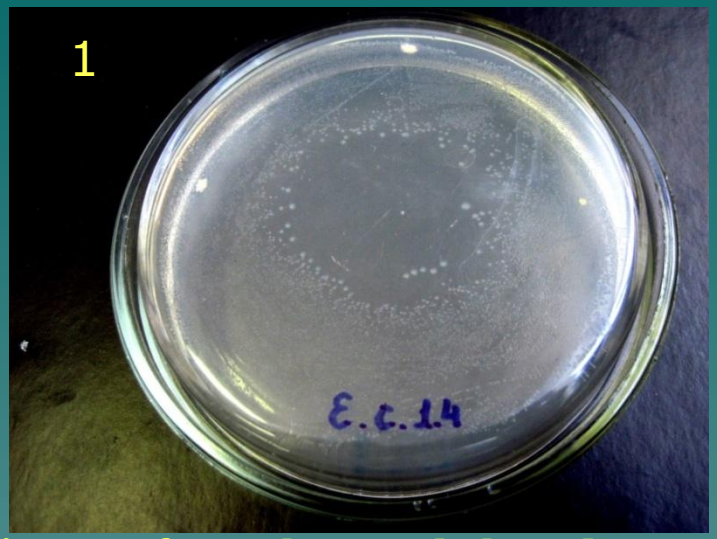


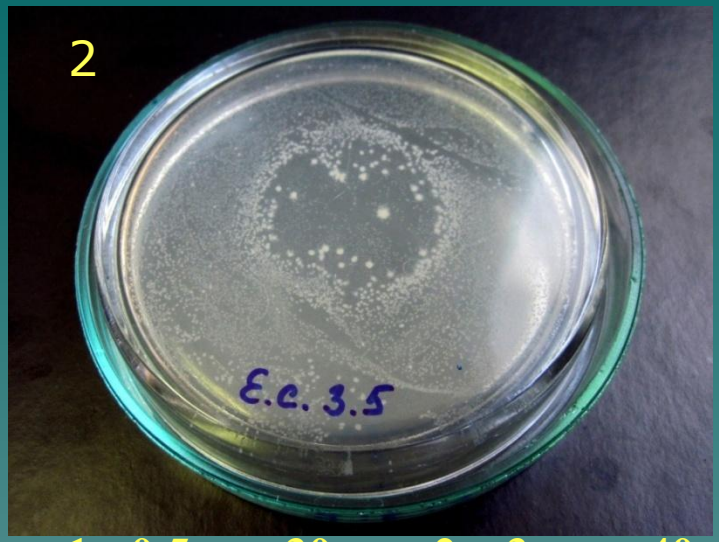
(a) – t=10 сек, (f) – t = 60 сек

inactivation zone`s diameter – contact time relationship



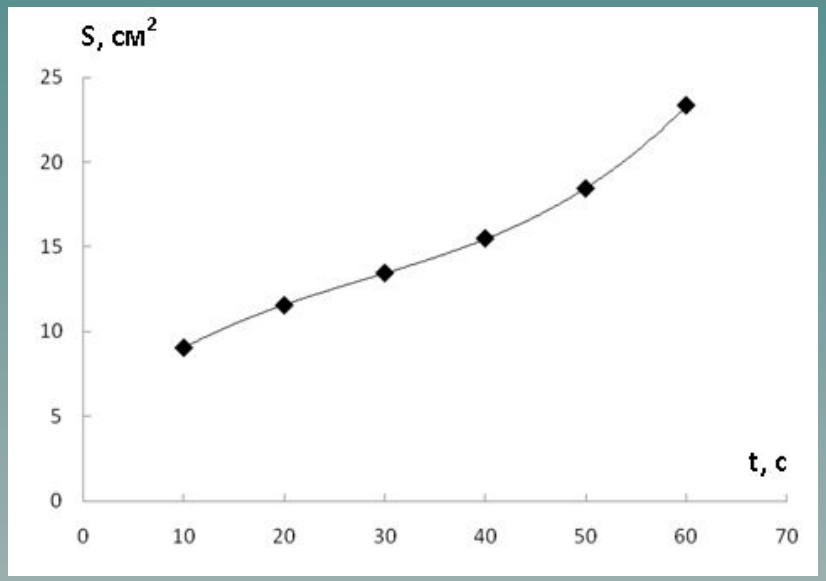
Influence of argon plasma on *Escherichia coli*





The distance from the nozzle h and exposure time: 1 - 0,5 см; 30 sec; 2 – 3 см и 40 sec.

The dependence of the inactivation zone from the time



№	Microorganisms	The time required for complete inactivation of bacteria		
		Cold argon plasma	Ultraviolet radiation	Hydrogen peroxide (H_2O_2)
1	*Escherichia coli*	5	1200	180

In conclusion:

- The high sensitivity of Escherichia coli and natural association of microorganisms to the treatment by cold argon plasma was proved.
- Optimized conditions of treatment by plasma : the time – 60 с.; I = 500 мкА; h - 0,5 см.

Thank you for your attention