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SYMBIOTIC NANO CHIPS SELF-SUSTAINABLE CHIPS

R.S.SHREE KUMAAR
Electronics And Communication Engineering Department
SriramEngineeringcollege
Perumalpattu, Thiruvallur District-602024
Shreekumaar1993@Gmail.Com

ABSTRACT

Electricity is a major problem in today's world and most of the household items and industrial equipmentuse some form of electronic chips inside them. Power consumed by these silicon chips are also one of the criteria for mass electricity consumption. Nuclear power plant, solar energy and fast breeder technologies are some of the solutions for producing huge amount of power. But when the devices used are themselves power sustainable, the problem reduces less than 10%. Nanobots, Genetic recombination, Electronics and a little portion of biology can be used to prove theoretically the before mentioned line. Living nano chips can be produced to reduce the electrical scarcity of our society.

***Keywords*- power consumption, genetic recombination, nanobots, livingnano chips.**

I.INTRODUCTION

The primary target is to achieve an engineered chip that requires less power but produces a higher output range. This chip must be efficient, reconfigurable, effective in all situations and it must definitely satisfy the conditions of a normal silicon chip inside a device. The described chip will be made up of special characteristics taken from unique creatures and compounds. Not all species have the best capacity to withstand high electrical conductivity, so it is vital that we should select one that satisfies this basic condition.

II.SELECTION PROCESS

Electric eel

Electric eel is one of the exquisite creatures that can withstand and produce electric power up to 600 volts. This voltage is greater than our average two phase and three phase supplies. It is as much as so high that it can kill other living organisms within few seconds. The particular reason why it is chosen is that it uses this production of power only when it fears to be in danger. (i.e.) it uses electricity as a protection ring against its enemies.

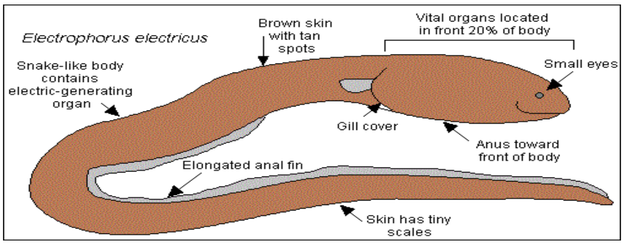


Fig: Electric eel-physical structure.

Engineers long have known that great ideas can be lifted from Mother Nature, but by researchers at Yale University and the National Institute of Standards and Technology (NIST) takes it to a cellular level. Applying modern engineering design tools to one of the basic units of life, they argue that artificial cells could be built that not only replicate the electrical behaviour of electric eel cells but in fact improve on them. Artificial versions of the eel's electricity generating cells could be developed as a power source for medical implants and other tiny devices, they say.

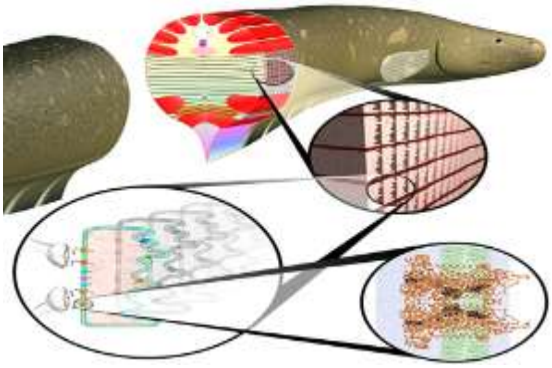


Fig: Presence of cells that generate electricity.

Electric eels channel the output of thousands of specialized cells called electrocytes to generate electric potentials of up to 600 volts, according to biologists. The mechanism is similar to nerve cells. The arrival of a chemical signal triggers the opening of highly selective channels in a cell membrane causing sodium ions to flow in and potassium ions to flow out. The ion swap increases the voltage across the membrane, which causes even more channels to open. Past a certain point the process becomes self-perpetuating, resulting in an electric pulse traveling through the cell. The channels then close and alternate paths open to "pump" the ions back to their initial concentrations during a "resting" state.

Nanobots

The nanobots are micro sized organisms that are engineered to be sent through tiny places that cannot be imagined. But till date nanobots are only being used in the medical fields for internal exploration of the cells and tissues of several organisms. Earlier this decade, nanobots where sent through the blood stream of a cockroach to inspect it.

Fig: Nanobot-cell exploration.

It'slike a computer inside a cockroach. Nano-sized entities made of DNA that are able to perform the same kind of logic operations as a silicon-based computer have been introduced into a living animal. The DNA computers – known as origami robots because they work by folding and unfolding strands of DNA – travel around the insect's body and interact with each other, as well as the insect's cells. When they uncurl, they can dispense drugs carried in their folds.DNA nanobots could potentially carry out complex programs that could one day be used to diagnose or treat diseases with unprecedented sophistication. The nanobots are labelled with fluorescent markers, so that the researchers can follow them and analyse how different robot combinations affect where substances are delivered. It is said that the accuracy of delivery and control of the nanobots is equivalent to a computer system. This is the first time that biological therapy has been able to match how a computer processor works.

Fig: Nanobot-testing the cell membrane.

Genetic Recombination

Genetic recombination is the process of artificially inducing a specific characteristic of an organism into another organism. This process depends on the chromosomes of both organisms. It is essential that both the chromosomes match each other or it can cause a fatal response on both the organisms or the organism the chromosome is being induced.

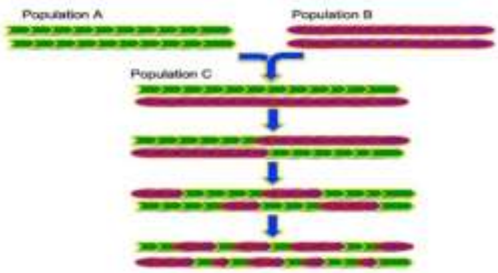


Fig: Genetic recombination.

Recombination initiates at double-stranded DNA breaks and at single-stranded DNA gaps. These DNA strand discontinuities can arise from DNA-damaging agents and from normal DNA replication when the DNA polymerase encounters an imperfection in the DNA template or another protein. The machinery of homologous recombination acts at these breaks and gaps to promote the events that result in gene recombination, as well as the reattachment of detached replication arms and the resumption of DNA replication.

Symbiotes

Symbiotes are organisms that are considered to live on the abilities of their host organism. They feast on the resources that the host provides and live as long as possible. But during times of scarcity these symbiotes prove to be good and help the host to survive. There are also certain period of time when the symbiotes are the reason for the destruction of host.Symbiotes consume food more than we could imagine. So it is necessary that we choose a efficient host that provides the symbiotes with all the resources it needs.

Symbiosis played a major role in the co-evolution of flowering plants and the animals that pollinate them. Many plants that are pollinated by insects, bats, or birds have highly specialized flowers modified to promote pollination by a specific pollinator that is also correspondingly adapted. The first flowering plants in the fossil record had relatively simple flowers. Adaptive speciation quickly gave rise to many diverse groups of plants, and, at the same time, corresponding speciation occurred in certain insect groups. Some groups of plants developed nectar and large sticky pollen, while insects evolved more specialized morphologies to access and collect these rich food sources. In some taxa of plants and insects the relationship has become dependent, where the plant species can only be pollinated by one species of insect.

Fig: Bacterial Symbiote inside a creature.

Electronics

Any device that requires a control mechanism regardless of the size needs a silicon chip for processing. Depending on the mechanism required size of the silicon chip differs. Recent researches have been in the process of manufacturing silicon chips at nano scale. Though it is a difficult task, scientists are not losing their confidence. The particular chapter in electronics that deals with the design of silicon chips is VLSI design. Any large circuit on a PCB board or a bread board can be minimized into micro scale with today's VLSI design technology.

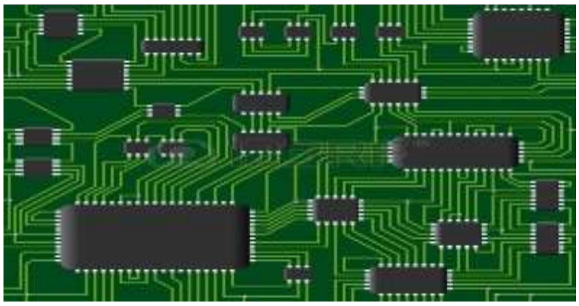


Fig: Example of silicon chip.

As the days pass by the size of the chip is considered as much as its function. Researchers are awaiting the manufacturing of chips that has best functionality and fine structure.

EXPERIMENTATION

Step 1:The electrifying characteristics of the electric eel is separated and isolated.

Step 2: The isolated chromosomes are paired up with the chromosomes of the chosen symbiote with the help of genetic recombination.

Step 3:Nanobots used in the medical field are re-engineered to perform the tasks of shaping and transportation of data.

Step 4: The VLSI design for the silicon chip required for a device is planned and the data about it is stored into the nanbots.

Step 5: Each of the nanobots are encoded separately so that they can be programmed later if they are needed to re-configured.

Step 6: These nanobots are induced into the stream of the symbiotes. They are tested first for shaping and control of the symbiote's activities.

Step 7: When the test is proved successful, using the nanobots electrifying characteristic of the eel is triggered in the symbiote.

Step 8: It is essential that the nanbots are somehow coated with an insulating layer that can withstand the electric shock.

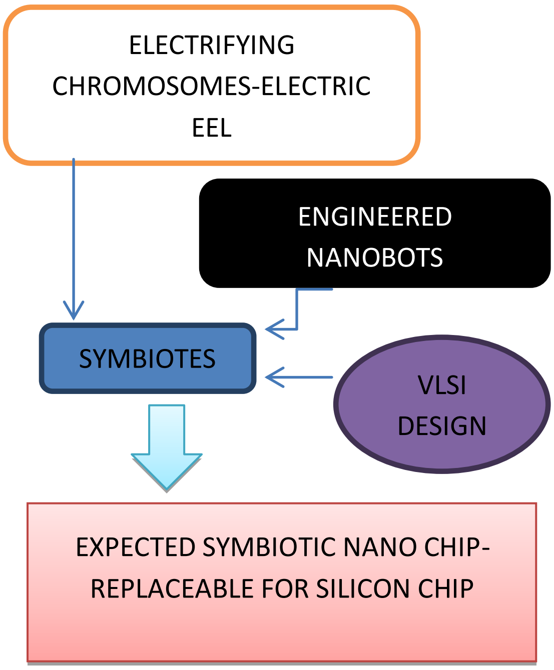
Step 9: It is also necessary that Thermal Shock does not occur over the entire time of process.

Step 10: When all these tests are proved efficient, the nanobots are signalled to take the form of the required chip.

Step 11: Under the lab conditions this chip is tested at various electrical levels for stability.

Step 12: Finally when all the tests are successful, the chip is inserted into the device.

FLOW GRAPH



TEST RESULTS

The skin of the electric eel was tested with several chemicals and it's V-I characteristics were observed. The timing taken by the predator to bite and the coagulation of the venom gave evidence for reciprocation.

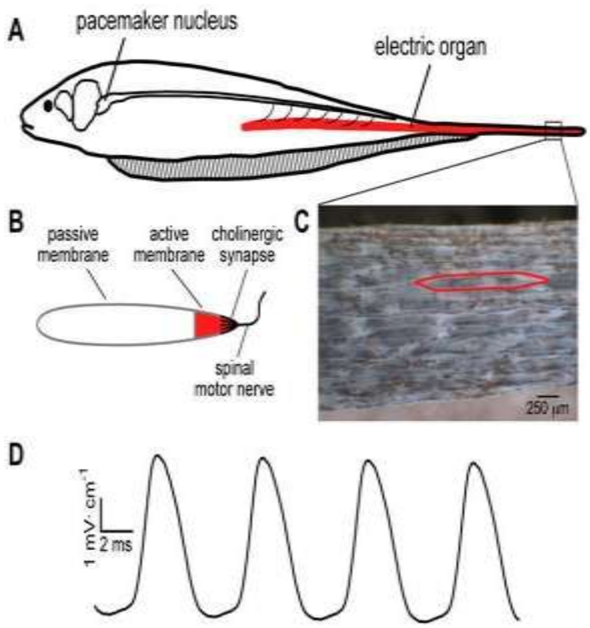


Fig: [A,B]-Explanation on organs necessary for shock , C-Microscopic view of the tail portion, D-Electrical waves(voltage) in time plot.

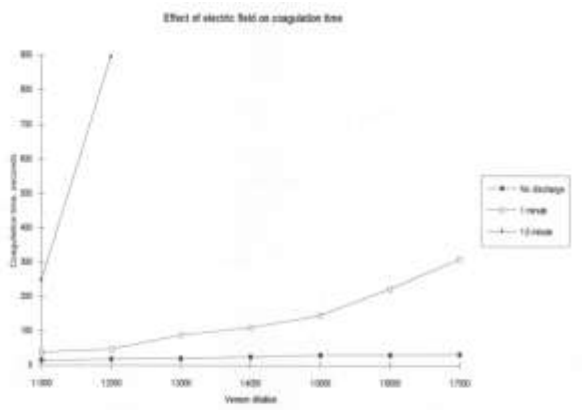


Fig: Coagulation time VS venom dilution Graph

MERITS

- The devices in which these chips are inserted do not require power supply for a long term (approximately 3 months at least).
- These symbiotic chips can be re-engineered and used in other devices as well.
- The nanobots act on the symbiote with a healing effect and this keeps them stable for ages.
- Power consumption of most of the devices will be reduced drastically.
- With a few hours of electricity black-out the government can provide power supply to rural areas, think about a week or a month without black-out of any region, power supply can be provided in abundant to all places.

DEMERITS

- The effects of the recombination can only be studied when they are implemented on a larger scale.
- Limited life time for tissues can create a problem after few months or a year.

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