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Experimental Search for the Ways to Get a Film Piezoelectric Biogenerator from Fish Scales.

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Relevance and problem:

The project is due to the fact that today there are problems of the exhaustibility of natural resources and the deterioration of the Earth's ecology, scientists in the future are closely associated with environmentally friendly energy sources, one of these energy sources is a piezoelectric generator. Film scale biogenerators can become current sources for medicine, electronics, etc.

Aim:

Search for ways to obtain film piezogenerator from fish scales.

The object of the study:
Biogeneratorfrom fish scales.

The subject of the study:
Piezoelectric film, jelly and scales.

Objectives:

- to explore electricity from fish scales.
- to explore options piezo generator from scales.
- search for the ways to get a piezoelectric film and bioplastic.

Novelty:

Biopiezoelectric film obtained from fish scales.

Hypothesis:

We assume that piezoelectricity from a film of scales can be used as a power source and we want to test this by constructing a model

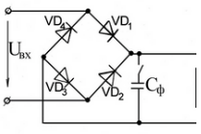
Experimental procedure:

Piezoelectric current source from fish scales

Manufacturing steps:

1. Washing and drying the scales
2. Fastening with double-sided foil tape on the laminate - contact 1
3. Laying the scale layer on the scale foil
4. Laying and fastening the second layer of foil - contact 2
5. Installation of wires
6. Lamination
7. The source gives alternating current

Current rectification



The rectifier consists of four diodes and two capacitors.
Diodes are unidirectional.
The capacitor smooths out the ripples.

Source operation test

Type of fish	U, mBvoltage		I, mA current strength		P, μWpower		Length cm	
	2019	2021	2019	2021	2019	2021	2019	2021
big crucian	0.5	fifty	0.65	fifteen	0.325	700	182	182
Chir	2.2	3.5	0.7	0.13	1.54	0.455	230	230
small carp	0.8	12	0.3	ten	0.24	120	171	171
Scale leaf	3.2	53	0.9	1.4	2.88	74.2	560 cm^2	560 cm2
carpafter digestion	1.5	32	0.9	4.6	1.35	147.2	153	153

Conclusion: the mistake of the past years is that we did not press the scales so much, with strong pressure the power increases.

HIKING biogenerator from scales

To get a source in during hiking, we take any container, dry scales, we use thin metal cans for the manufacture of contacts

Sources	pressure weight	voltage
carpbig	500g	6.9mV
pike	500g	2.4 mV
Red omul	500g	8.3mV

The source made on an adhesive basis

Sturgeon bubble glue, scale powder made using protosubtilin
PVA glue, solid scales.
Sturgeon bubble glue, solid scales.
ATconclusion:fish scale powder in sturgeon glue IS more efficient than SOLID, the sources are very unstable, the more pressure ,the more voltage

Load in grams	Glurgvawho lescales	Powderfrom scales	Whole scales
100	0.6 in	0.04mv	35.6mv
200	0.8mv	1.8mv	21.3mv
300	13mv	100mv	33.4mv
400	33mv	160mv	35.5mv
500	40mv	183mv	38.2mv
600	52.5mv	203mv	40.8mv

Conclusion: fish scale powder in sturgeon glue IS more efficient than SOLID, the sources are very unstable, the more pressure ,the more voltage

Film source using protosuptulin

For the manufacture of a film generator based on protosuptulin, first wash the scales, then added to the wet scale sprotosuptulin and dried. After that, cook the scales over low heat for 3 hours after expiration time scales squeeze into the fat, the dissolved part we distribute the contents on a flat surface and leave for six hours at a temperature of 30 degrees. The film turned out to be very thin and cloudy, the film was 80 square cm, while it gives from 0.3-0.4 Volts and more, the current is 0.2 milliamps

Samples	voltage	current
Film from scales	10mV	0.1mA
Scale film with protusuptulin	220 mV	0.2mA

Conclusion: the film becomes thicker with a large number of scales and the duration of digestion,

Study of the source working

To increase the power, the following five studies were carried out:

1. Increase in length.
2. Analysis of fish scale size.
3. Analysis by fish species
4. Plates from scales.
5. Boiling plates. .

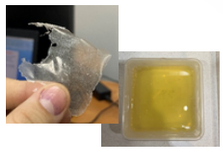
Search for ways to increase the power of sources.

source	Voltage, V	Current A	Power, W
Large carp scales	1.34	0.04	It became 0.005
	0.5 mV	0.01mA	It was $5*10^{-9}$
230cm long ribbon	18.38	0.1	1.8
chir	2.2 mV	0.08 mA	It was $0.18*10^{-9}$
Solid carp	1.16	0.9	Became 1,044
560cm^2	3.2 mV	0.5mA	Was $1.6*10^{-9}$
Film	0.22mV	0.2mA	Was $0.044*10^{-9}$
	0.3	0.05	It became 0.015

Conclusion: When tested after long-term storage (1-2 years), the scale sources increased their power.

JELLY and film from carp scales

Ultimatethe goal of our experiments should be a film FROM fish jelly that is in the scales. the film is translucent, light and very thin, the VOLTAGE of the film depends on the area, with the area7 SQUARE centimeters film gives 0.1-10 millivolts. CURRENT 0.2 mA. You need a lot of scales, you need to find a way to increase the strength of the film.



Conclusion: with more scales, the power of the generator becomes greater, when time runs out, the generator deteriorates.

Source from carp scale jelly

To making fish scale jelly we took 150 grams of scales per liter of water and boiled at a low boil for 3 hours after washing and wrapping in cheese cloth. After the time has elapsed, we squeeze the cheesecloth into a fat, the dissolved part of the contents of the cheesecloth bag. Edible gelatin was added to stabilize the shape. A complete source of fish scale jelly and hot gelatin yields 40milliamps. The concentration of jelly scales turned out to be very small 1:10 approximately.

Conclusion: with more scales, the power of the generator becomes greater, when time runs out, the generator deteriorates.

Conclusion:

Work on the creation and testing of a piezoelectric biogenerator from fish scales showed that:
By placing the scales between the conductors at a pressure of even sound, we obtain a small current;
The longer the device, and the larger the area, the more we get electricity;
The power of the biogenerator depends on the type of fish and the condition of the scales;
Plates after boiling became thinner, cleaner, while the voltage value increased.
Cartridge case can be filled with scales and used as a battery;
A jelly-like and film source requires a large amount of scales.
Fish scale powder is very unstable
The next step is to obtain a stronger, more flexible and larger biofilm area