

Russian scientists create a three-layer sorbent to purify drinking water from zinc

Scientists of Siberian Federal University [have developed](#) an inexpensive highly selective sorbent with a “three-layer” structure. It reacts exclusively to zinc contained in samples of drinking water from artesian wells and natural reservoirs. The experts assure that a very small amount of their sorbent is sufficient to determine the presence of a hazardous metal in water, and its concentration can easily be evaluated by the glow of the sorbing agent: the brighter the glow the more zinc, and the more dangerous this water is for living organisms.



*‘We proposed a sorbent based on silicon oxide, which was sequentially treated with polyamine and ferron. Silicon oxide is very common and therefore cheap, polyamine encapsulating it works as a glue, and ferron placed on top is responsible for the visible reaction to the “enemy”. The result is three-part polymer-containing granules (in large quantities they look like fine light powder) which are tailored specifically to search for zinc and reacts to it by glowing. This is a very profitable sorbent as it is easy to manufacture, and the reaction we see is unambivalent — a bright green glow in the ultraviolet rays means that you should not drink such water at least, and using it for agricultural purposes will not probably bring you any good either. The zinc content in it exceeds the permissible amount,’ — explained **Olga Buyko**, one of the authors of the development, research engineer of the Department of Science and Innovation of Siberian Federal University.*

Scientists noted that the three-layer structure of the new sorbent is obtained due to a special chemical interaction: OH-groups are located on the surface of silicon oxide, and protons torn from them create a negative charge. Exactly the same thing happens with ferron which is coated with negatively charged sulfogroups.

*‘We remember from school that a minus repels a minus. Therefore, to somehow fasten the parts of this crumbling pie, we needed polyamine with this beautiful name polyhexamethylene guanidine (PHMG) — it is thanks to it that we get the necessary interaction between all the sorbent components. You can use this development in public and private laboratories or standardization centres. Any water regardless of whether it is from a well in a personal plot, from a reservoir, from a tap, can even be quickly checked for zinc. But portable sensors for tourists, geologists and travellers cannot be made because you need a UV source as the sorbent does glow only in UV rays due to the luminescence of the zinc surface complex with ferron. But the cost of this analysis will decrease significantly due to our sorbent. Now we can check water for zinc admixture using atomic absorption or atomic emission, which will cost about 500 roubles, while using our powder you can do the same for only 5 roubles,’ — **Olga Buiko** gives in detail.*

The researchers say that while commercialization is far away yet, the new sorbent is still undergoing the necessary stages of testing and refinement. But, probably, in the foreseeable future it will be adopted by the relevant organizations of Krasnoyarsk Territory, which monitor contents of heavy metals in natural

environments. Also, this firefly sorbent can help environmental organizations in Siberia in monitoring and cleaning ponds of this heavy metal.

[Пресс-служба СФУ](#), 12 december 2019

© Siberian federal university. Website editorial staff: +7 (391) 246-98-60, info@sfu-kras.ru.

Web page address: <https://news.sfu-kras.ru/node/22561>