ANFO is a group of blasting explosives used in mining. The materials are characterized by low sensitivity which makes them difficult to detonate. This is due to the fact that the detonation takes place through thermal decomposition of the material at a constant speed, much lower than the speed of sound. This poses a potential threat to their use, because the thermal decomposition may cause ignition of airborne dusts. It is therefore important that ANFOs do not detonate by thermal decomposition but by a detonation wave that propagates at a much higher speed, thus transferring more energy.

Therefore, compounds are added to them in order to increase their sensitivity. Unfortunately, these compounds are very toxic for the environment and man and they themselves have high sensitivity to stimuli such as detonation wave or impact. These properties increase the danger of working with these compounds. Other methods used to increase the sensitivity of ANFO are associated with expensive treatment of the material, so you have moved away from them.

The aim of our project is to find non-toxic additives to ANFO that do not require expensive material processing. Nevertheless, they will increase the sensitivity of ANFO in a similar way without the risk of uncontrolled detonation.

The research we want to conduct will be based on:

- Underwater tests, in which we will test the rate of detonation wave propagation under water. The test will consist of placing the explosive in a transparent aquarium filled with water, with which we will detonate and measure how fast the front of the wave moves.

- ANFO microstructure examination using scanning electron microscopy (SEM)

- The test of how the detonation wave propagates in the air, how it affects the materials set at a certain distance from each other and whether it is possible to cause their explosion in this way. It will also be important to determine whether the shape of the material and its mass also influence the propagation of the wave.

-Research to determine the strength of the detonating wave blast

In addition, our research will also determine whether it is possible to control the ANFO detonation using the tested additives. This will increase the safety of their use.