

# Biodegradable polymer composite materials made from inorganic fillers and fibers

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Nowadays, along with creating materials with enhanced mechanical characteristics, it became important in the light of ecological problems, to design eco-friendly materials capable to disappear with time after fulfilling functions, in other words to develop biodegradable mechanically strong materials. In the article there is discussed mechanical characteristics and technology of preparation polymer composite with biodegradable polymeric matrix.

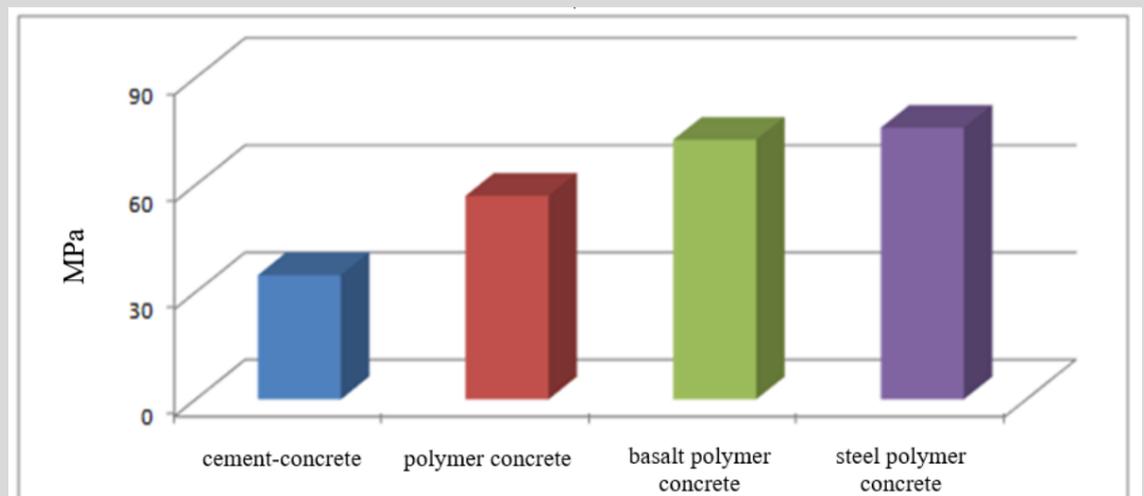


Figure 1. The comparative durability of cement-concrete and reinforced polymer concrete on compressing

- The durability limit of plastoconcrete on compressing is 57,0MPa, armoplastoconcretes - 72,6-76,0MPa. Reinforcing by fibers gives 27-33 % increase of the durability limit on compressing of plastoconcrete. There is no big difference between the durability limits of plastoconcrete reinforced by steel and basalt fibers. The diagram presented below (see Figure 1) reflects the comparative durability of cement-concrete and reinforced polymer concrete on compressing.
- The durability limit of plastoconcrete is 7,35MPa, armobasalt –plastoconcrete -10,4MPa, and armosteel – plastoconcrete - 8,42MPa. So, The durability of plastoconcrete on tension compared to cement concrete's durability is approximately 7 times higher. Reinforcing of plastoconcrete by basalt and steel fibers gives the increase of durability accordingly by 41 and 14%. In this case, a basalt fiber not only equals but also exceeds with its efficiency a steel fiber.
- The preference of plastoconcrete at shocking compared to cement concrete was increased. The indicator of shock resistance of cement concrete is 3,3kgf.cm/cm<sup>3</sup>, the analogue indicator of plastoconcrete - 36,2 kgf.cm/cm<sup>3</sup>. Unlike cement concrete, basalt, as well as steel fibers (inserted in plastoconcrete) do not increase a shock resistance indicator seriously.

Homo-PEU (1-L6) was used as a biodegradable component of PC and round-shaped samples were made. PC with above mentioned biodegradable components are shown in Figures 2-3.

The innovative idea of this research is to make a composite, which would be strengthened by fibers and solid nanoparticles. It should be noted that this sort of polymer would satisfy a wide range of requirements. we are able to insert the biodegradable components into polymer material that would convert polymer material into biodegradable material and therefore our planet would be protected from potential pollutants.



Figure 2. The sample prepared for biodegradability study

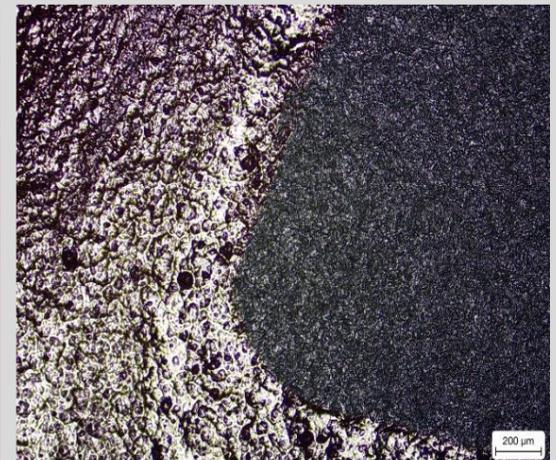


Figure 3. The sample's morphology, Zeiss (x50)

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