A team of scientists from the Lobachevsky University Department of Solid State Chemistry under Dr. Evgeny Bulanov has developed a new method for obtaining bismuth-containing apatite and has studied its crystal structure and thermodynamic properties with the purpose of modeling its behavior under service conditions.

Materials based on compounds with a crystalline structure of apatite have a wide range of applications, from fertilizers to ionic conductors. This is due to the fact that almost any element of the periodic system can be incorporated into the structure of such substances, which results in a change in the material's performance characteristics.

Hydroxyapatite with the formula Ca$_5$(PO$_4$)$_3$OH is widely applied in the field of medicine as the basis for materials used to restore bone tissue. It is chemically and structurally similar to the bone's inorganic component.

The studies of this compound and its analogues have been conducted at the UNN Department of Solid State Chemistry for about 10 years. One of the latest achievements is the introduction of bismuth atoms into the crystal structure of the compound. Bismuth and its compounds exhibit antimicrobial activity, therefore, bismuth-containing apatite can be used to produce a material combining biocompatibility and antimicrobial properties.

To obtain the substance, a solid-phase synthesis scheme was proposed, which made it possible to substantially lower the temperature of the process as compared with the literature data. The refinement of the crystalline structure of the compound was carried out by the Rietveld method enabling the determination of the distribution of atoms along crystallographic positions. It is necessary to know this distribution for explaining subsequently the substance's properties.