Terahertz (THz) solid immersion (SI) microscopy is an imaging technique providing subwavelength spatial resolution that has found many applications in recent decades [1–4]. The resolution of SI optical systems is determined by the refractive index of the SI lens material. In our work we have performed a numerical analysis using the finite-element frequency-domain method to evaluate the possibilities for improving the resolution using high-refractive index rutile (TiO_2) lens. To confirm these numerical data, experiments were carried out with test objects characterized by different absorption coefficients. Simulations to boosting the THz solid immersion lens performance have shown that the spatial resolution for the wide range of sample refractive indices $n = 1.0 - 5.0$ and absorption coefficients $\alpha = 0 - 1000\ \mathrm{cm}^{-1}$ by power. The calculations also have shown a strong contrast between strongly absorbing and weakly absorbing media, which, in turn, can be useful in determining the absorption coefficient and studying the hydration of objects using a rutile solid immersion microscope.

[1] N.V. Chernomyrdin *et al.*, *Applied Physics Letters* **110**(22), 221109 (2017)

[2] N.V. Chernomyrdin *et al.*, *Applied Physics Letters* **113**(11), 111102 (2018)

[3] N.V. Chernomyrdin *et al.*, *Optical Engineering* **59**(6) 061605 (2020)

[4] N.V. Chernomyrdin *et al.*, *Applied Physics Letters* **120**(11), 110501 (2022)