

# Team develops microscope to image microbes in soil and plants at micrometer scale

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LLNL researchers used multiple imaging modes to generate contrast and chemical information for soil microorganisms in roots, minerals and plants like switchgrass, shown here. Credit: USDA

Lawrence Livermore National Laboratory (LLNL) scientists have developed a custom microscope to image microbes in soil and plants at the micrometer scale.

Live imaging of [microbes](#) in soil would help scientists understand how soil microbial processes occur on the scale of micrometers, where microbial cells interact with minerals, organic matter, plant roots and other microorganisms. Because the soil environment is both heterogeneous and dynamic, these interactions may vary substantially within a small area and over short timescales.

Imaging biogeochemical interactions in complex microbial systems, such as those at the soil-root interface, is crucial to studies of climate, agriculture and environmental health but complicated by the three-dimensional (3D) collocation of materials with a wide range of optical properties.

Microaggregates (

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