

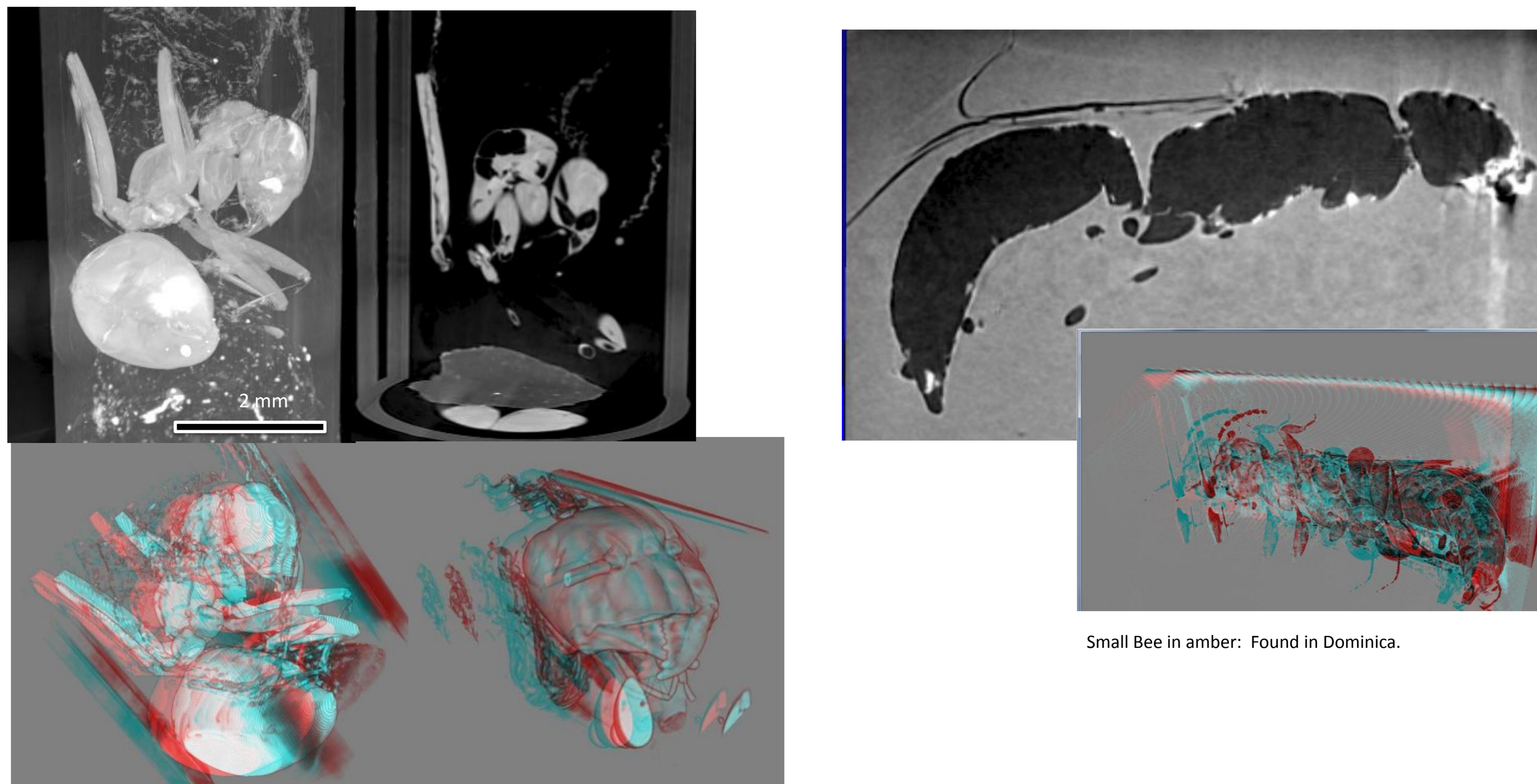
Applications of a High-contrast X-ray CT to Polymers, Insects, Plants, Foods, etc.

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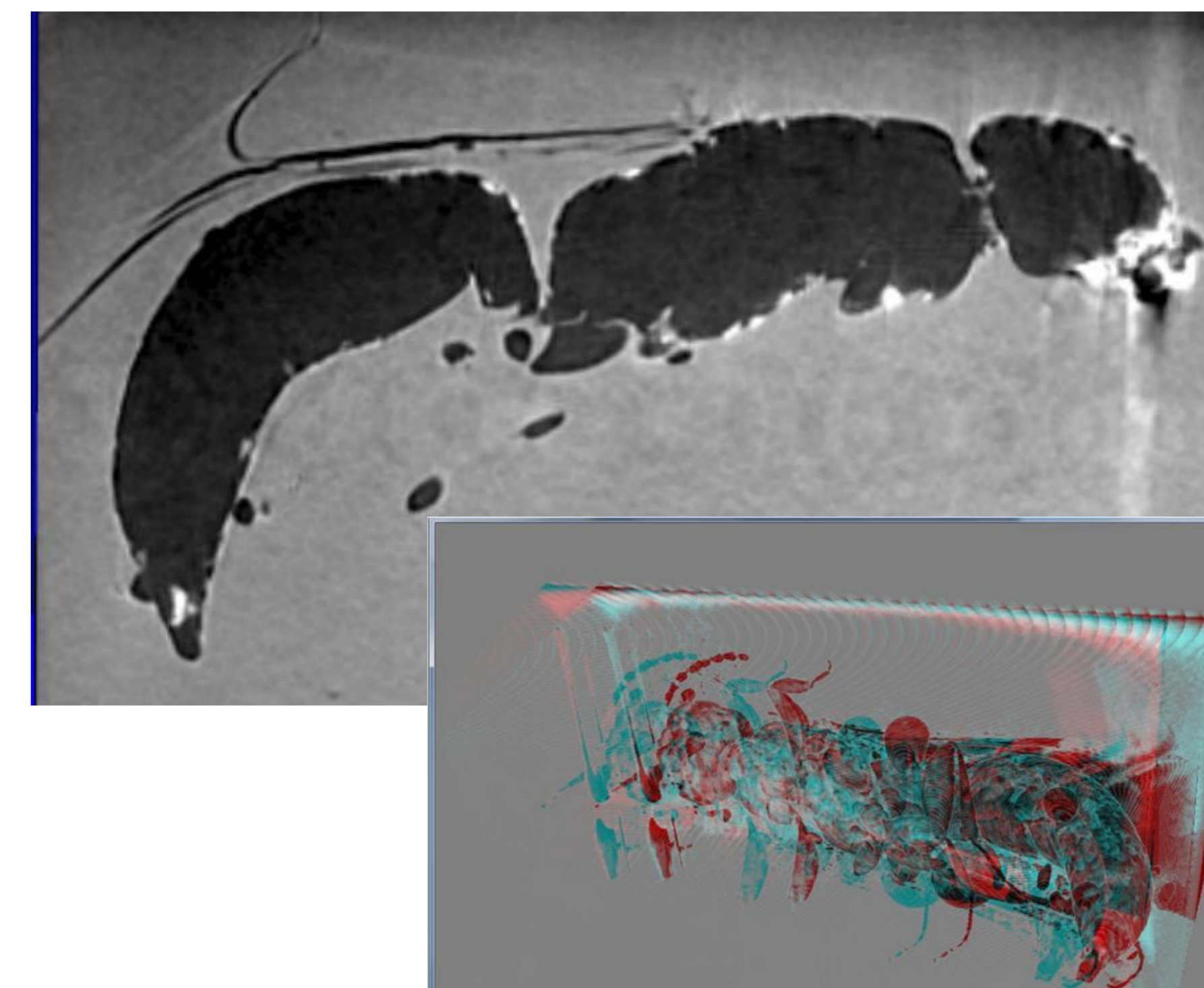
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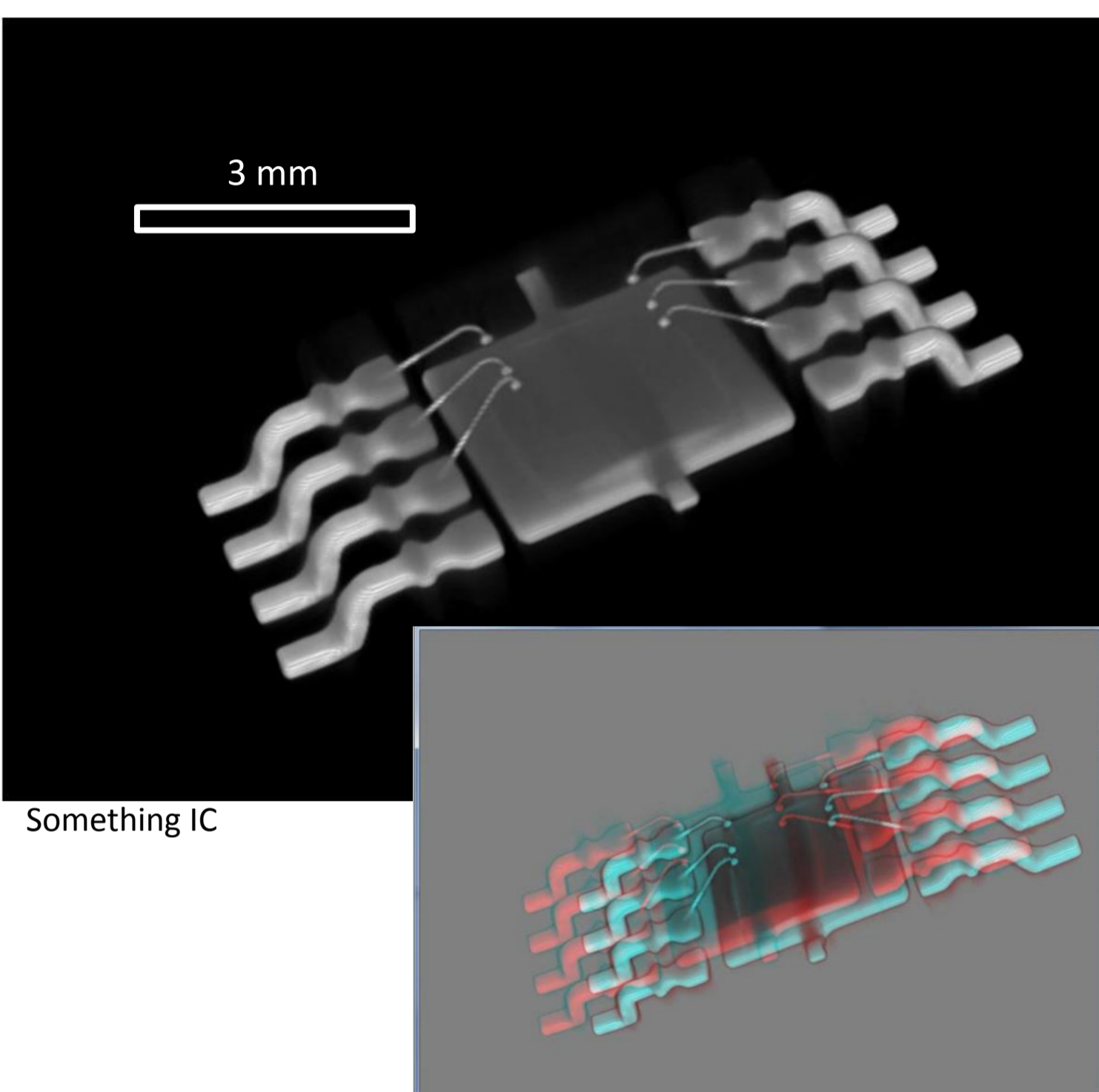
We have developed a high-contrast X-ray computerized tomography (XCT). Generally, X-rays have a high transmission especially for the objects consisting only with light elements, such as polymers and biological soft-tissues. Therefore, those objects have been considered to be inappropriate for the ordinary XCT observations without any contrast-enhancement such as chemical staining/doping or phase-contrast imaging. In ordinary XCT, the contrast of the reconstructed image is proportional to the X-ray absorption coefficient, μ , of the object. As shown in Fig. 1, μ is a function of the photon energy of X-ray, E , and roughly reversely-proportional to E^3 . This fact means that X-rays are no longer transitive if we use the sufficiently low E . Now, we have an empirical guideline between E and the preferable pixel resolution: $5.6\sqrt[3]{\ell} < E < 16\sqrt[3]{\ell}$, where ℓ is the edge length of pixel. We developed an XCT (now commercially available from Beamsense Co. Ltd., Japan) with $\ell = 3\mu\text{m}$ and $E = 15\text{ KeV}$ on average, which satisfies the empirical guideline. We applied thus developed XCT to many objects as follows:



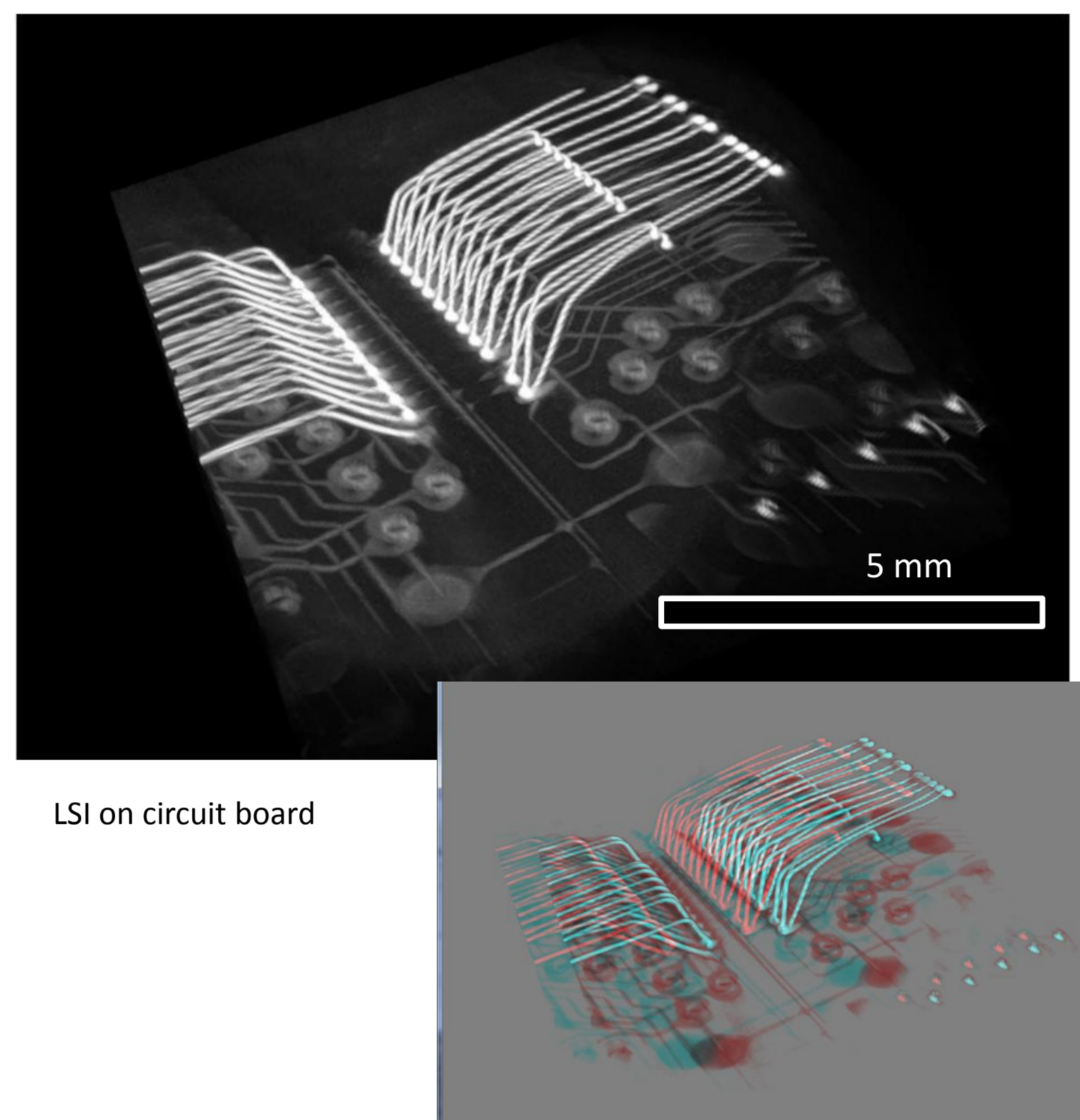
Ant: Winged female ant (candidate of queen).



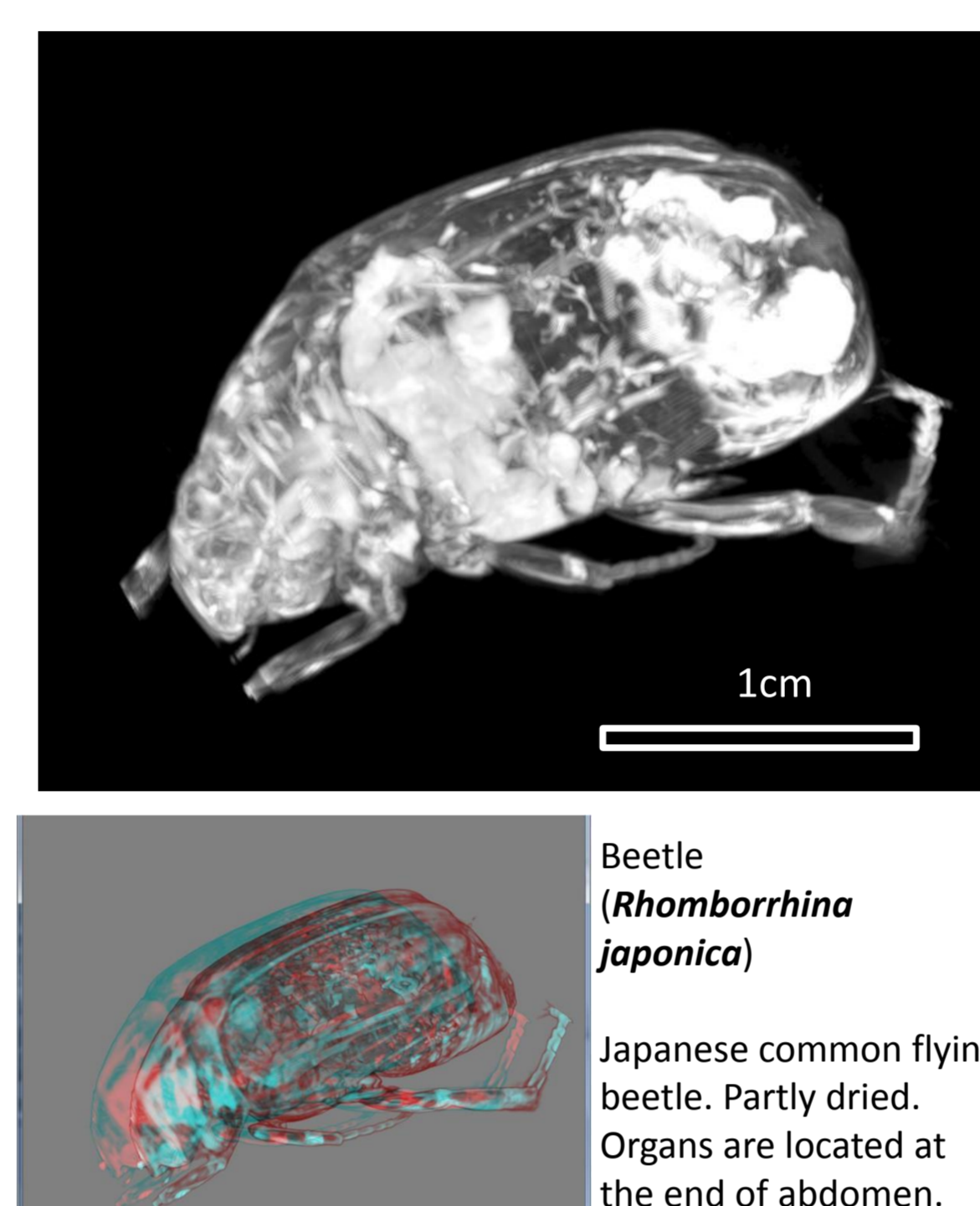
Small Bee in amber: Found in Dominica.



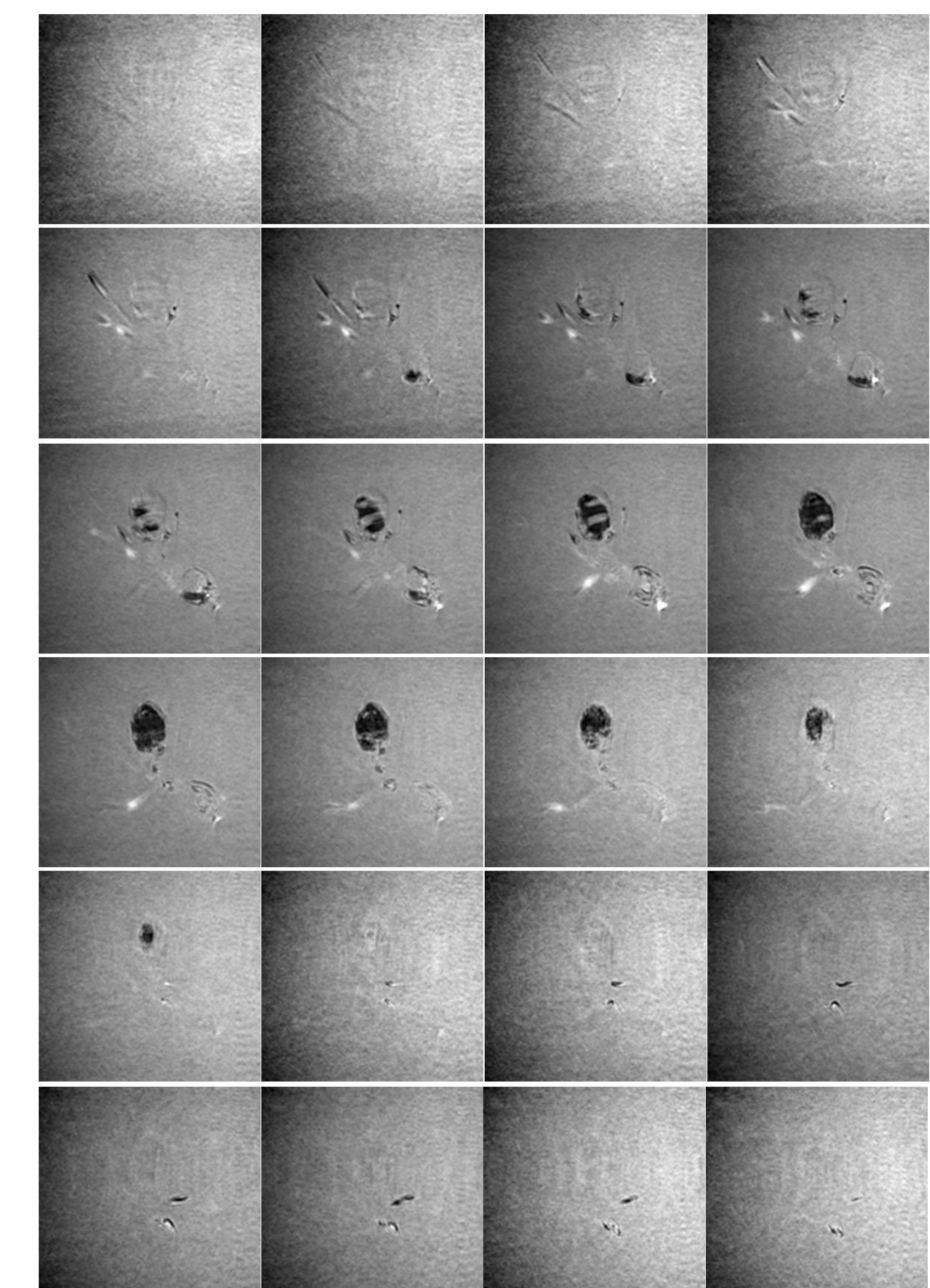
Something IC



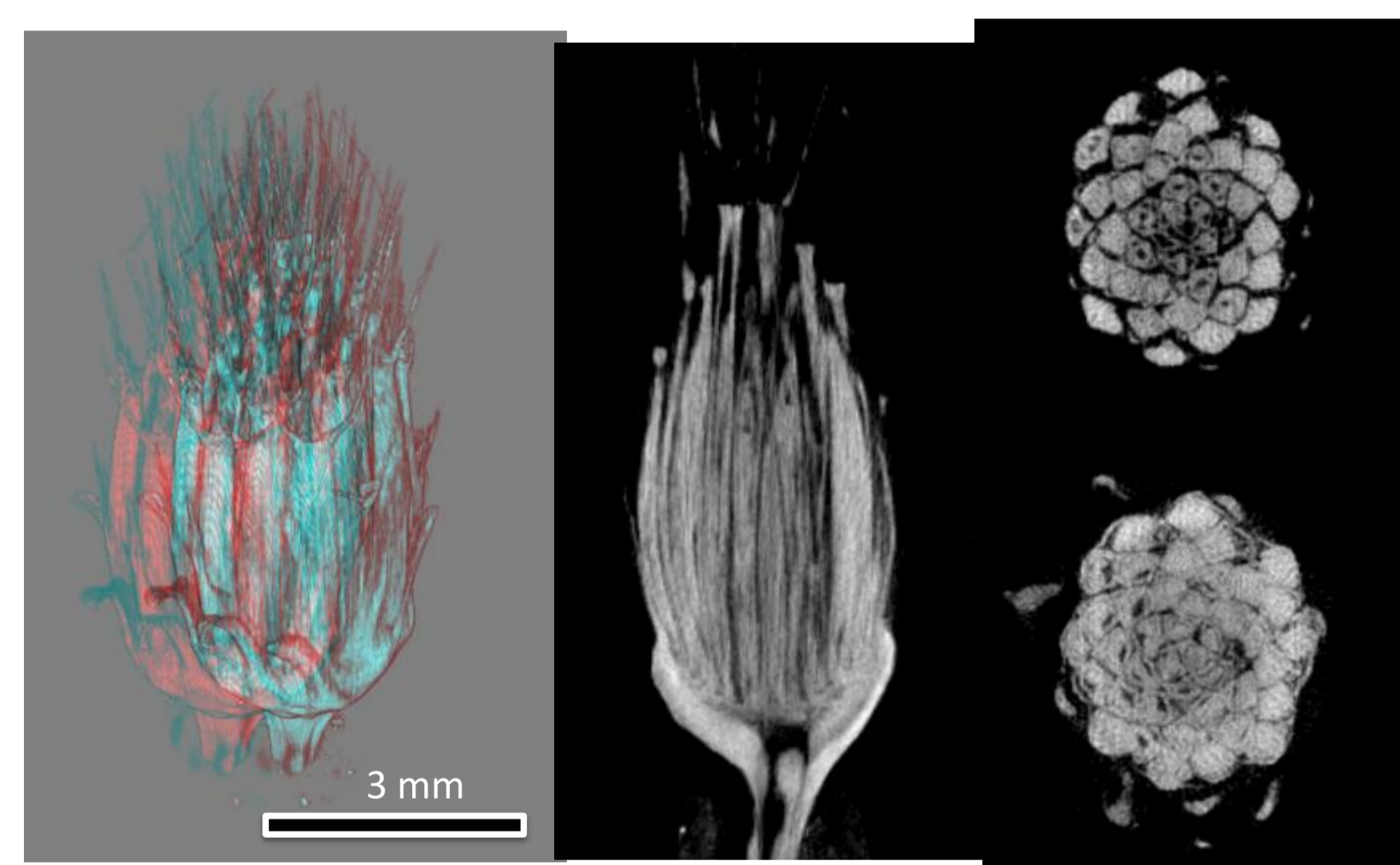
LSI on circuit board



Beetle (*Rhomborrhina japonica*)
Japanese common flying beetle. Partly dried. Organs are located at the end of abdomen.



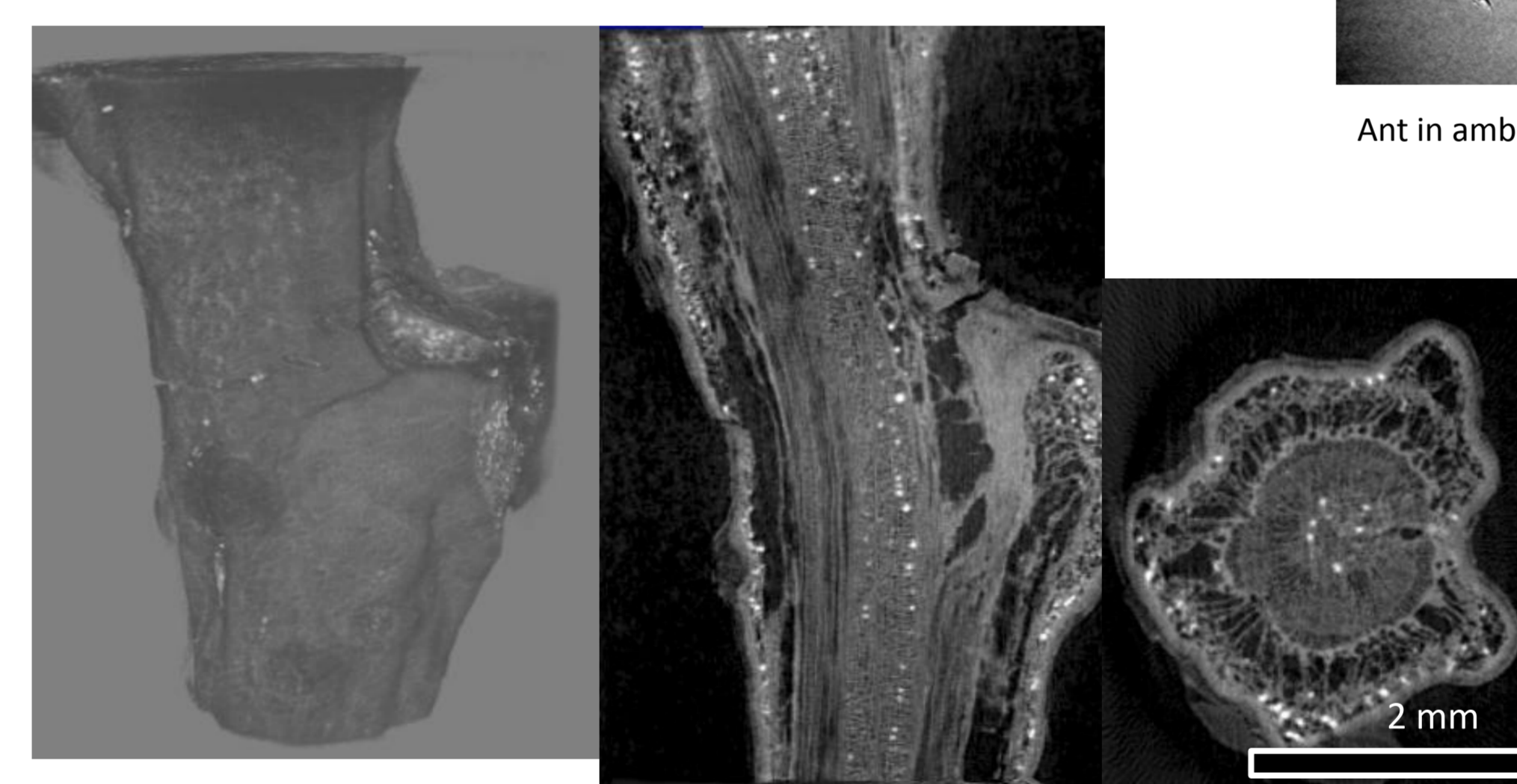
Ant in amber



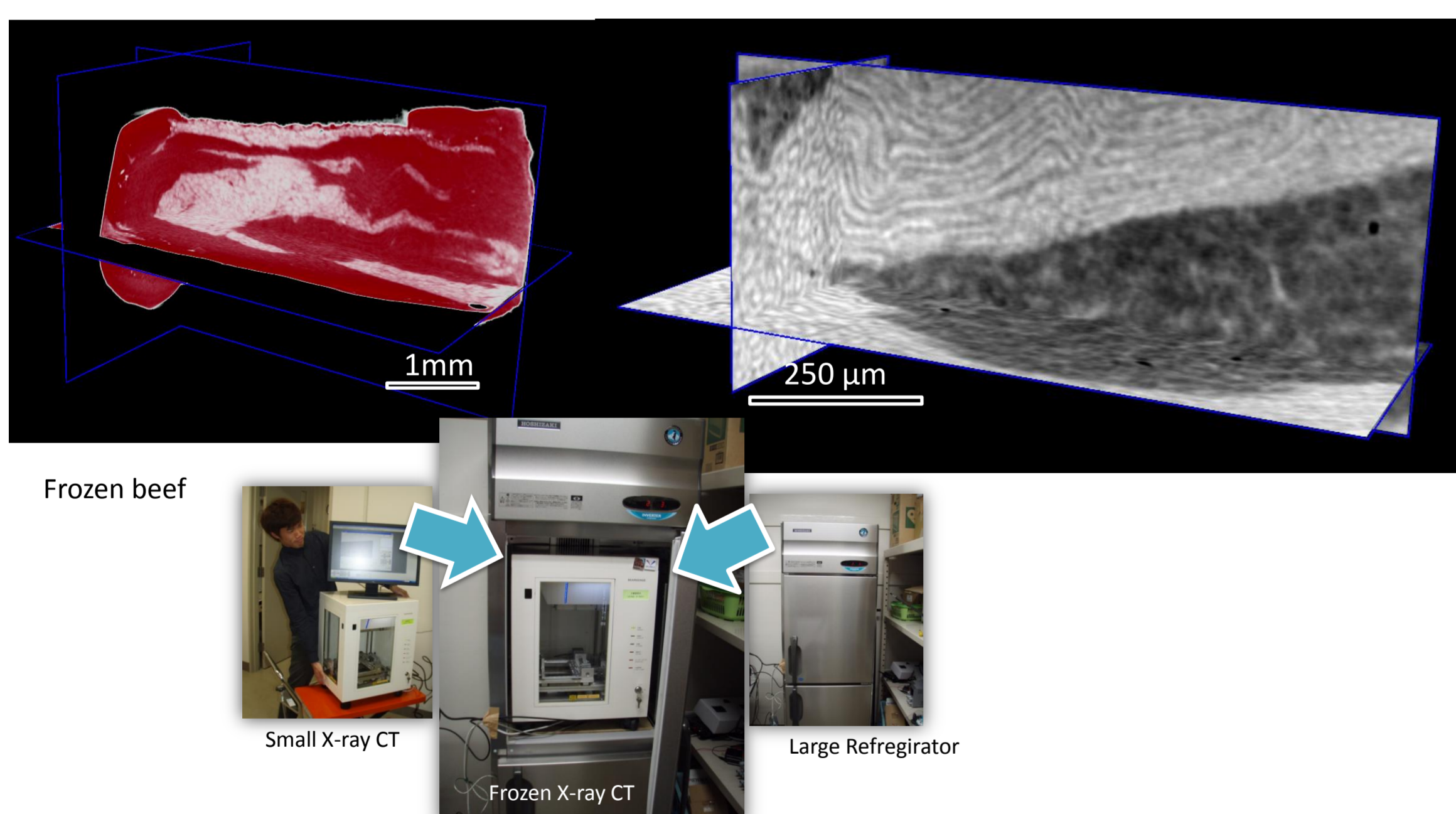
Bidens (Bidens) : Bidens is a genus of flowering plants in the family Asteraceae. Their seeds will stick to clothing, fur or feathers, and be carried to new habitat.



Mulberry

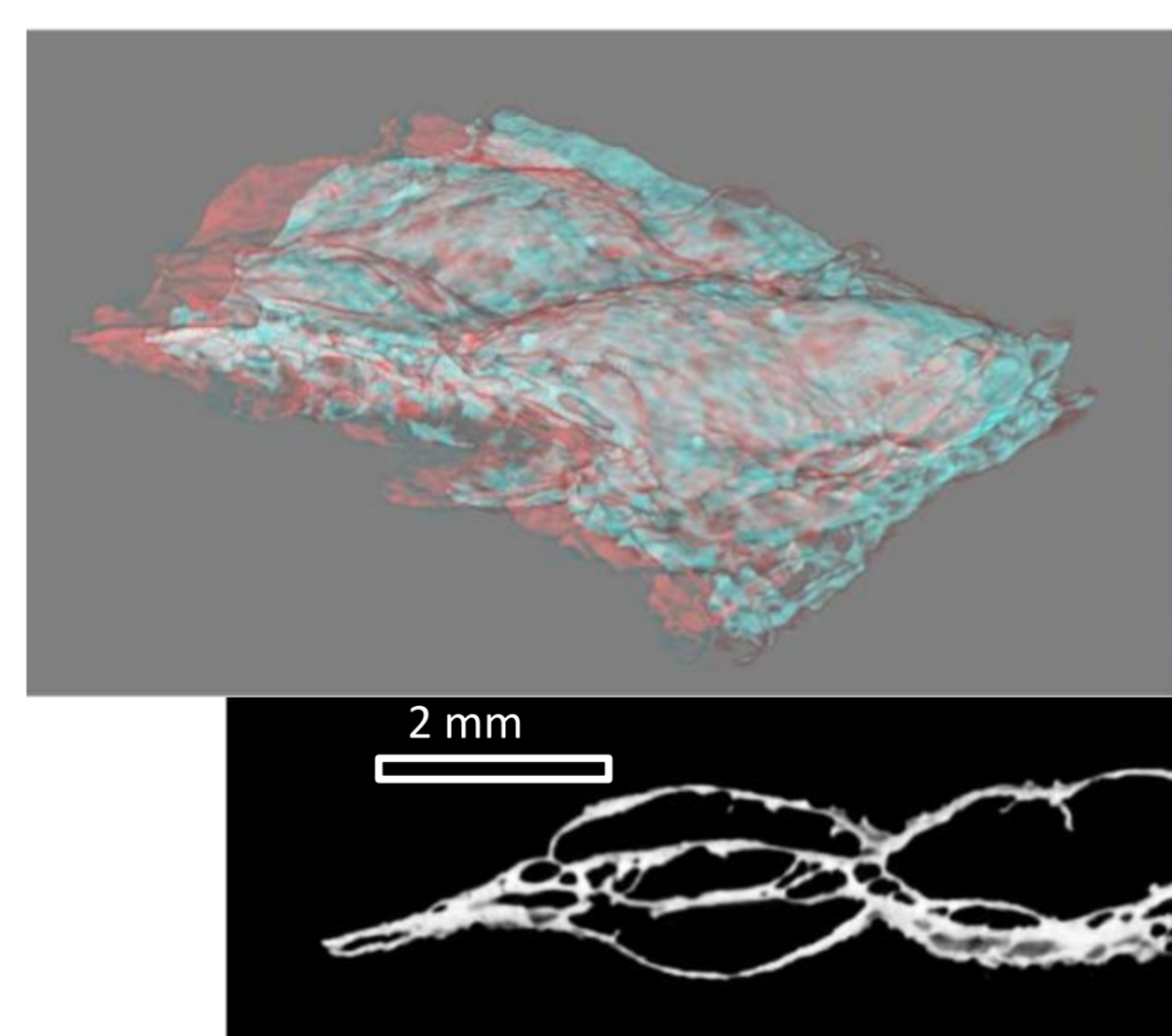


A twig of Cherry
The white particles are considered to be plant opal (calcium).

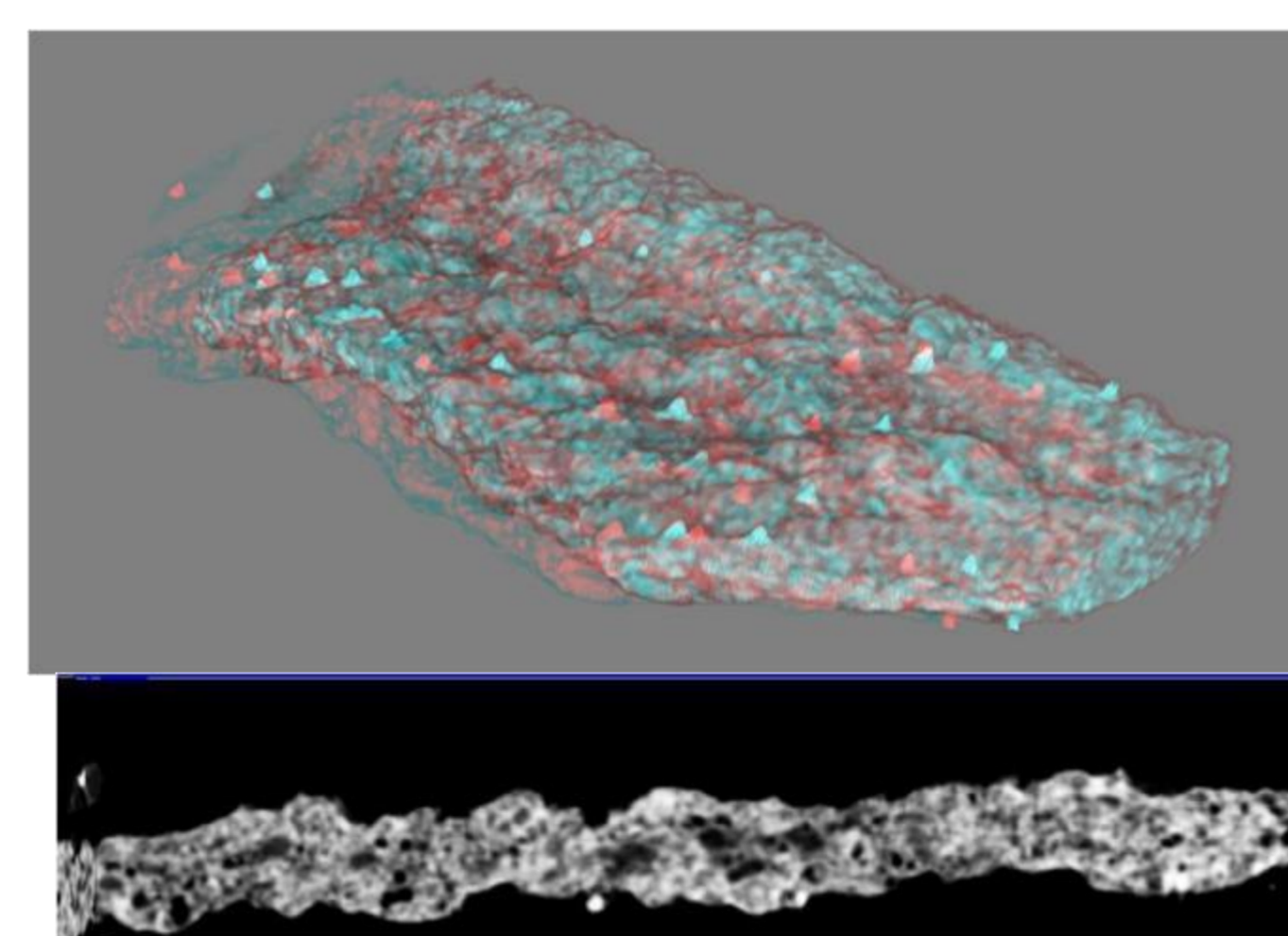


Frozen beef

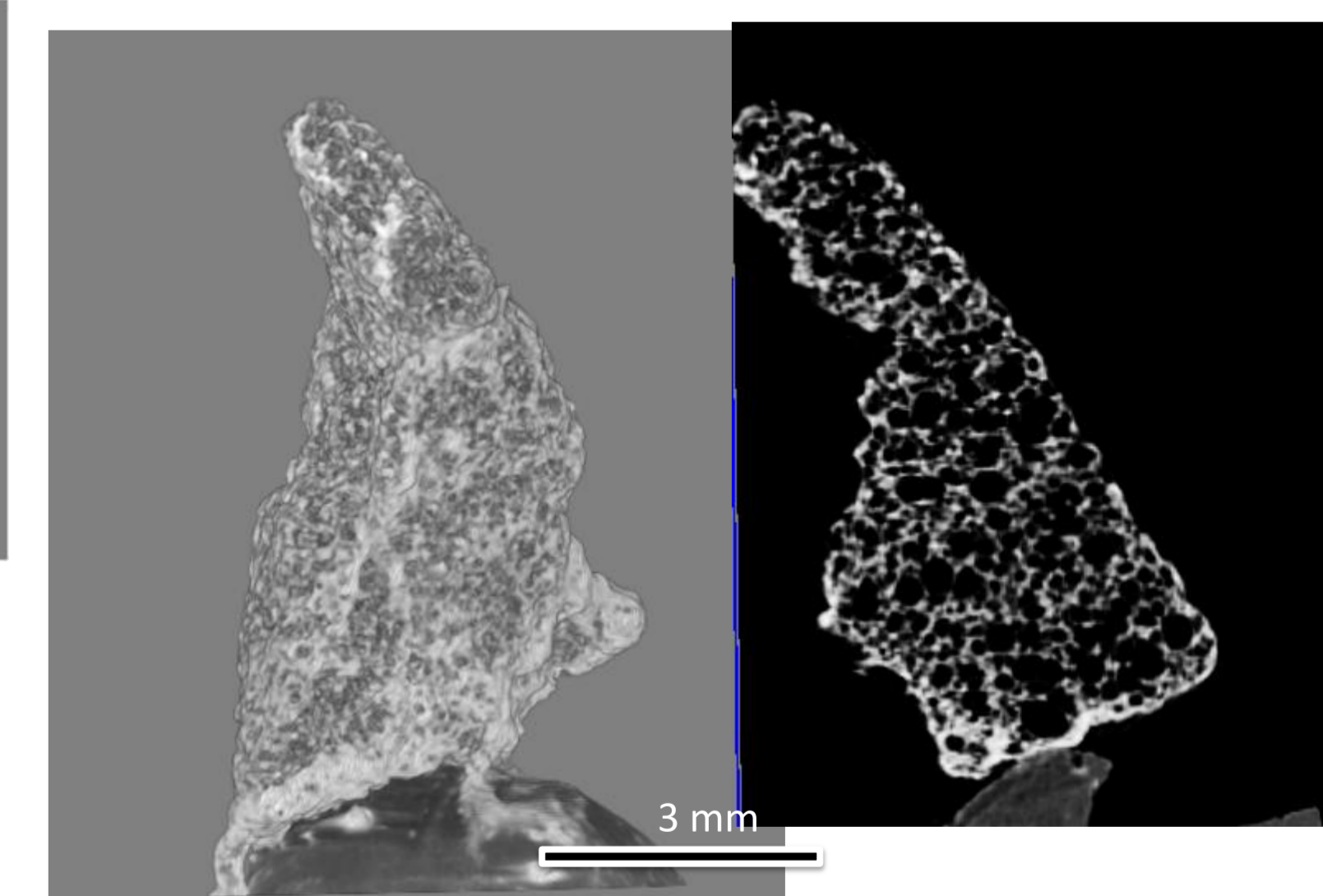
Small X-ray CT, Frozen X-ray CT, Large Refrigerator



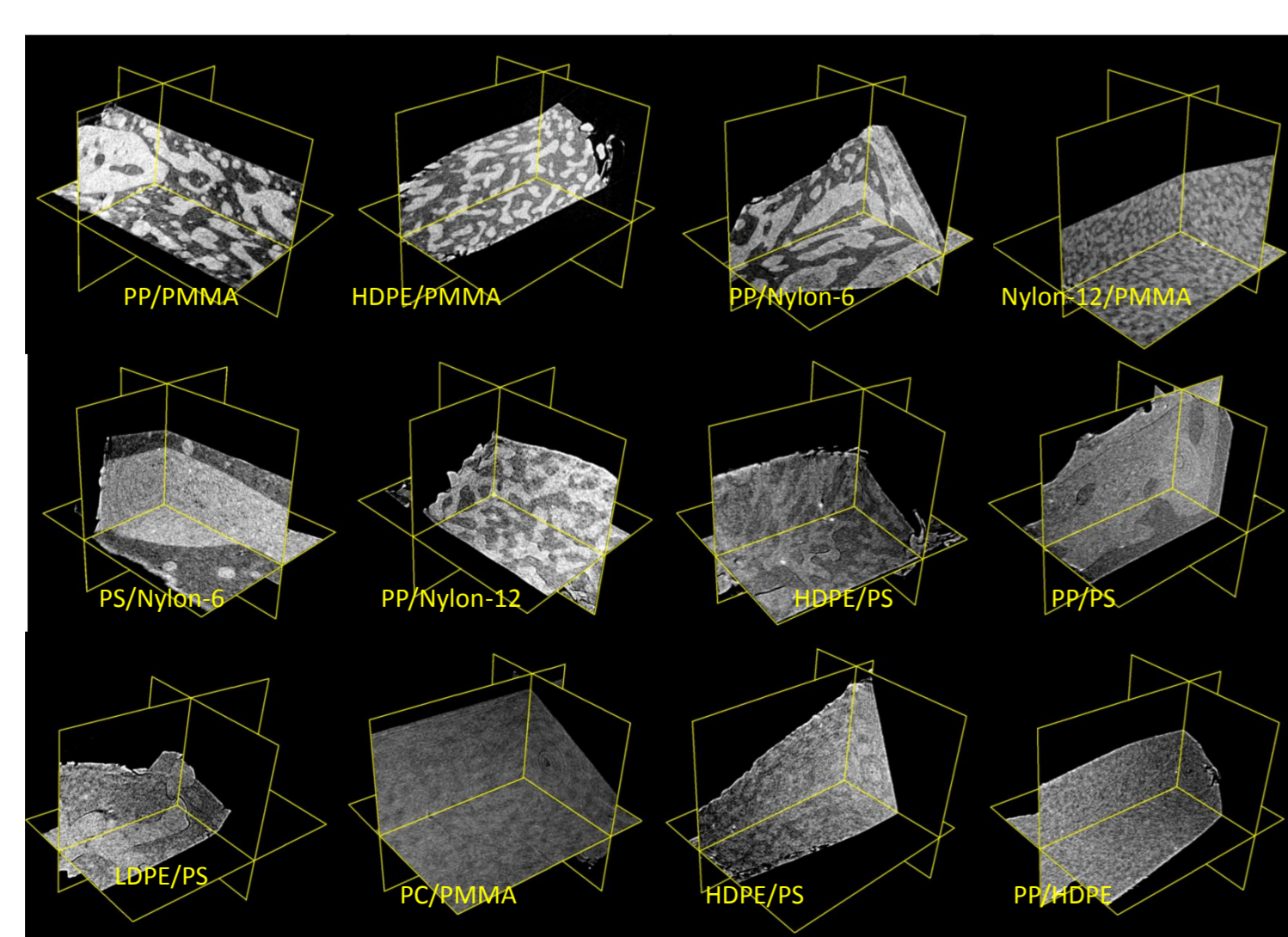
Potato chips



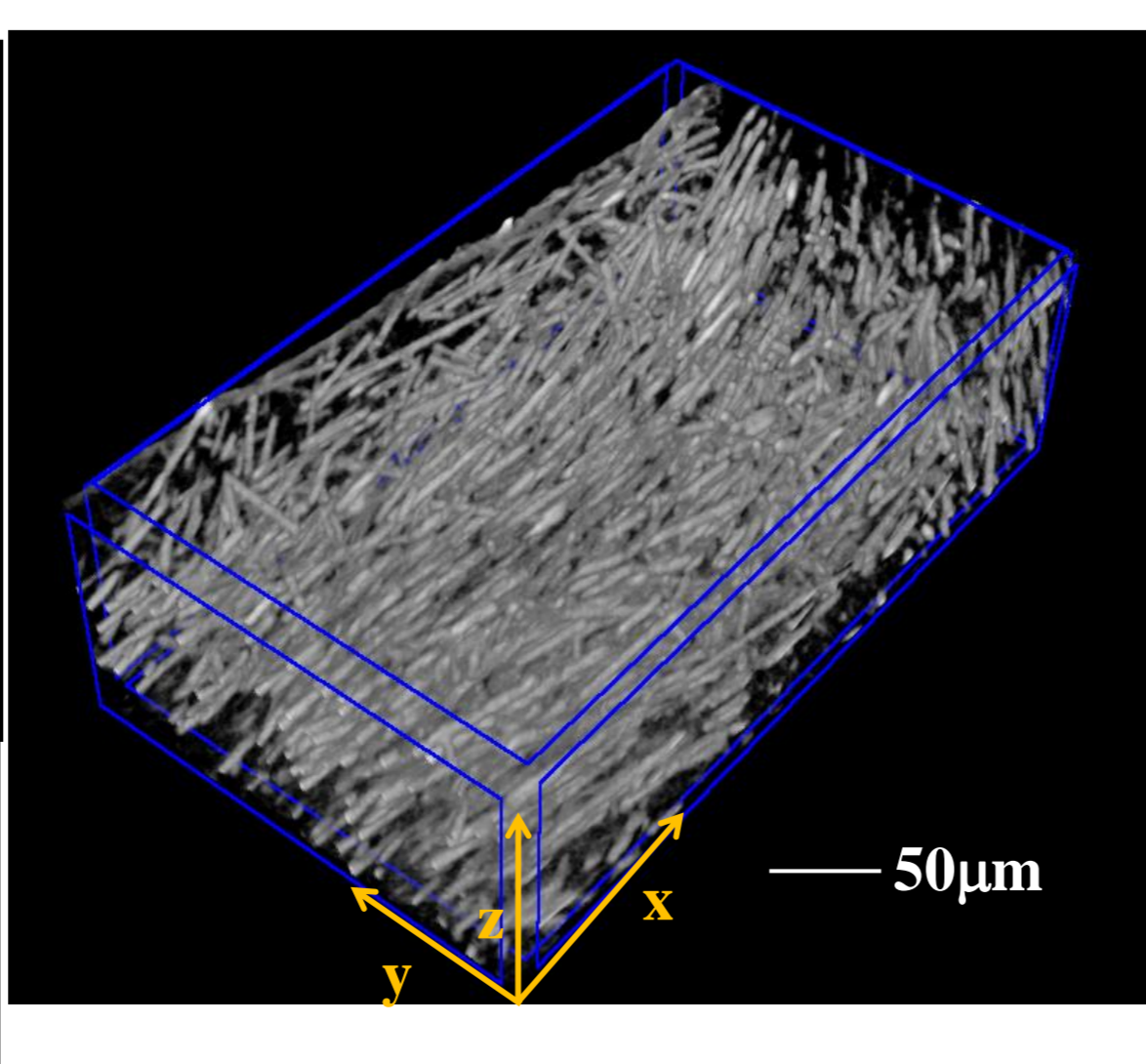
Potato chips (Pringles)



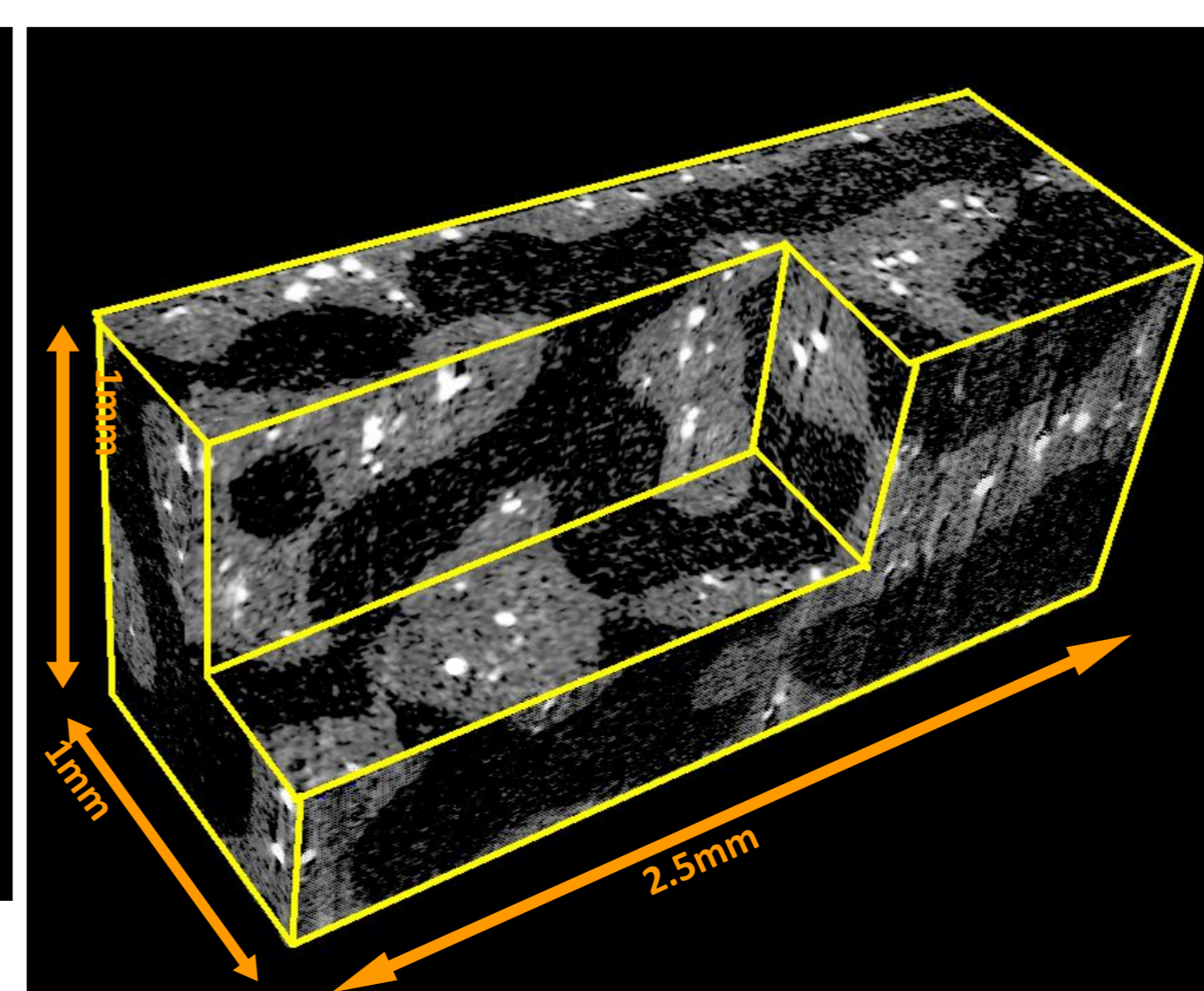
Marshmallow



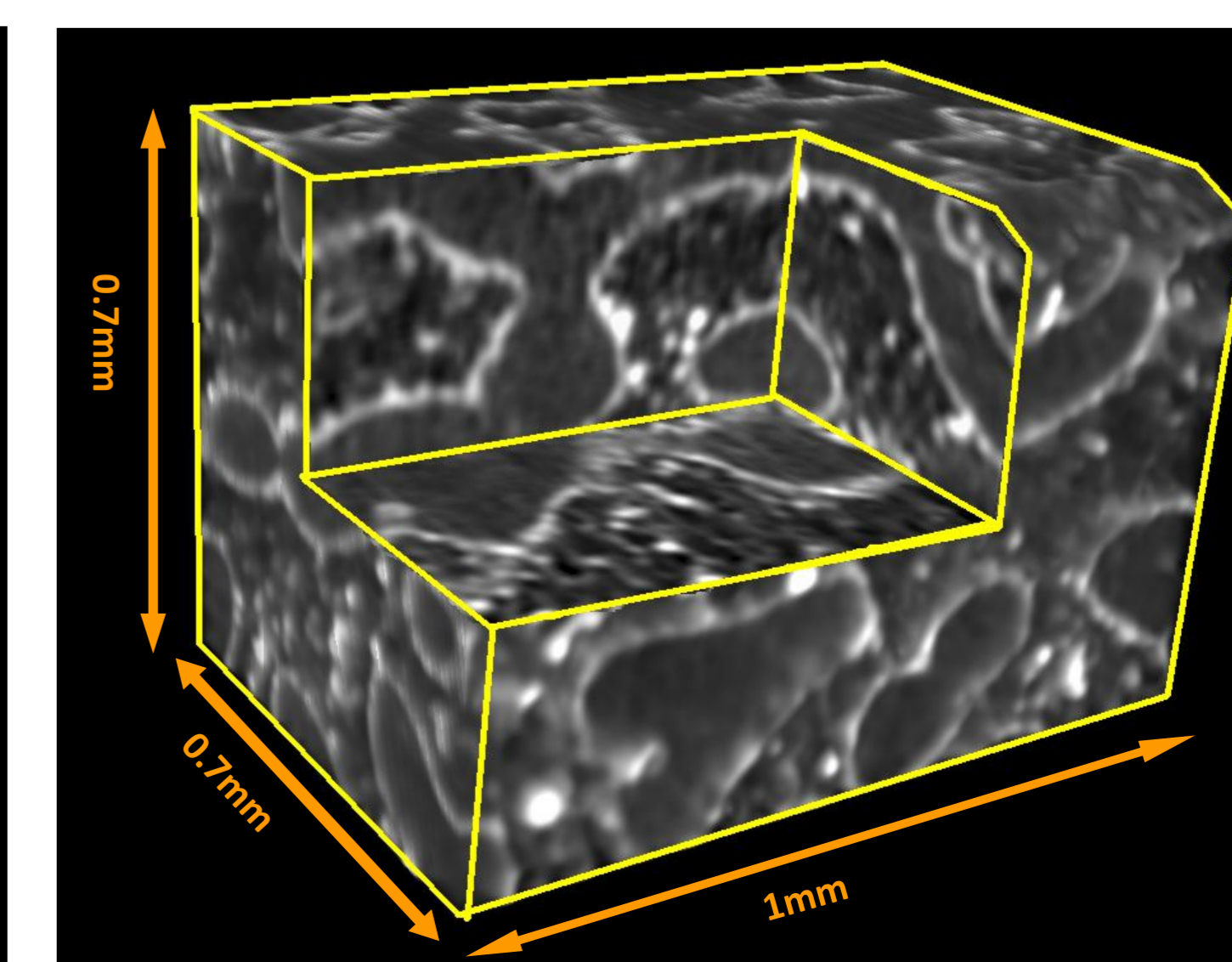
Polymer blends



Carbon fibers in PS



Alumina particles in PS/PMMA



Alumina particles localized at the interface of PS/PMMA