ESRF	**Experiment title: Is amorphous calcium carbonate a major component of avian bone?**	**Experiment number**: SC-3973
Beamline: ID 13	**Date of experiment**: from: 28 Nov 2014 to 03 Dec 2014	**Date of report**: Feb. 2020
Shifts: 15 shifts	**Local contact(s)**: Dr. Manfred Burghammer	*Received at ESRF:*

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Report:

The work based on this experiment has succesfully been published:
Kerschnitzki, M., Akiva, A., Shoham, A. B., Asscher, Y., Wagermaier, W., Fratzl, P., ... & Weiner, S. (2016).
Bone mineralization pathways during the rapid growth of embryonic chicken long bones.
Journal of Structural Biology, 195(1), 82-92.

Abstract:

The uptake and transport of ions from the environment to the site of bone formation is only partially understood and, for the most part, based on disparate observations in different animals. Here we study different aspects of the biomineralization pathways in one system, the rapidly forming long bones of the chicken embryo. We mainly used cryo-fixation and cryo-electron imaging to preserve the often unstable mineral phases in the tissues. We show the presence of surprisingly large amounts of mineral particles located inside membrane-delineated vesicles in the bone forming tissue between the blood vessels and the forming bone surface. Some of these particles are also located inside mitochondrial networks. The surfaces of the forming bones in the extracellular space contain abundant aggregates of amorphous calcium phosphate particles, but these are not enveloped by vesicle membranes. In the bone resorbing region, osteoclasts also contain many particles in both mitochondrial networks and within vesicles. Some of these particles are present also between cells. These observations,

together with the previously reported observation that CaP mineral particles inside membranes are present in blood vessels, leads us to the conclusion that important components of the bone mineralization pathways in rapidly forming chicken bone are dense phase mineral particles bound within membranes. It remains to be determined whether these mineral particles are transported to the site of bone formation in the solid state, fluid state or dissolve and re-precipitate.