We present high radiation dose absorption spectra of calcium carbonates using the high-flux VLS-PGM beamline. We show that amorphous calcium carbonate (ACC), and aragonite crystals evolve into what appears to be the more stable calcite polymorph when exposed to high radiation. Indeed, there is a gradual appearance of secondary “crystal field” peaks on the Ca 2p absorption spectra which are normally only present for the calcite polymorph. At very high-doses (we tested up to 69GGy), damaged aragonite could easily be confused with a calcite signal. We will also address some less spectacular effects (such as peak broadening) observed in the spectra of all relevant elements found in calcium carbonates (C, O, Ca).

While these spectral changes occur at relatively high doses, careful consideration should be given to them, especially in light of the recently obtained results on carbonate based biominearls[1].