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The effects of irradiation on the noble gases in matrix of Allende (CV) meteorite

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Micro- and nano-scale computed tomography (µ-CT, n-CT) is a relatively fast method for studying, among others, textural and physical properties of solid materials. For example, we are using micro- and nano-CT techniques to study chondrules and CAIs from primitive meteorites. If properly calibrated, CT studies can also help obtaining (qualitative) chemical information. However, there was always the question whether or not CT-techniques are non-destructive. We tested for this by using matrix material from the CV3 chondrite Allende. We prepared a powdered matrix sample and divided them into five aliquots; three aliquots were irradiated using a Bruker SkyScan 1272 µXCT-Scanner, at the Anatomy department at the university of Bern, operating at 70 keV, 50 keV, or 30 keV. Two samples served as non-irradiated standards. We investigated if the irradiation has any effect on the noble gas concentrations. We found that that there is no effect, i.e., the noble gas concentrations are indistinguishable between irradiated and non-irradiated samples. Since there is no effect for the very fine-grained matrix material, we can conclude that there is also no effect for larger objects like chondrules and CAIs.