#0037

$^{53}Cr/^{52}Cr$ chromium model ages of ordinary chondrites: implications for parent body formation and thermal evolution

Anand* A., Pape J., Wille M., Mezger K., Hofmann B.
*Institute of Geological Sciences, University of Bern, Baltzerstrasse 1+3, CH-3012, Bern
aryavart.anand@geo.unibe.ch

Chromite ($FeCr_2O_4$) occurs as an accessory mineral (0.2-1.0 wt.%) in all ordinary chondrite (OC) groups (i.e. H, L & LL). It has an Mn/Cr ratio near zero (≈0.01) and hence, preserves the Cr isotopic composition (i.e. $^{53}Cr/^{52}Cr$) of its host at the time of isotopic closure, which corresponds to the growth of chromite in the samples of low petrologic type. Chromites from the highest grade samples may record cooling below the closure temperature of the Mn-Cr system.

Studied chromite grains from type 3 OCs yield an average (initial ^{53}Cr) model age of ~3.5 Ma and chromites from type 6 OCs yield a model age of ~9.3 Ma after the formation of the Solar System respectively. The ages correlate with the degrees of metamorphism of the host meteorites, which supports an “onion-shell” structure of their parent bodyies. These ages constrain the time of accretion and onset of metamorphism on the chondrite parent body at ~3.5 Ma. They constrain a maximum time interval of ~0.5 Ma between the last chondrule formation/modfication and the accretion of chondrules in their respective parent bodies.

Cite abstract as:
Anand, A., Pape, J., Wille, M., Mezger, K., et al. (2019) 53Cr/52Cr chromium model ages of ordinary chondrites: implications for parent body formation and thermal evolution. Paneth Kolloquium, Nördlingen (Germany), abstract URL: http://www.paneth.eu/PanethKolloquium/2019/0037.pdf (abstract #0037).