Evidence of fossil record of ^{7}Be in a CAI: Implications for the early Solar system

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^{7}Be, that decays to ^{7}Li with half life of 53.06 ± 0.12 days [1], is a key short-lived now-extinct radionuclide to derive information about early solar system event and processes. Lithium-berylium-boron (Li-Be-B) isotope systematics studies in the first forming solar system solids, Ca-Al-rich inclusions (CAIs) provide a unique opportunity of utilising two isotope decay systematics of ^{7}Be and ^{10}Be to ^{7}Li and ^{10}B, respectively, to understand cosmochemical/astrophysical conditions and plausibly also chronology of the events and processes in the early solar system [2-4]. A first unambigous detection of ^{7}Be along with fossil records of ^{10}Be corresponding to ^{7}Be/^{9}Be of $(1.2\pm1.0)\times10^{-3}$ (95% conf.) and ^{10}Be/^{9}Be of $(1.6\pm0.32)\times10^{-3}$ is being inferred from the regression of the in situ isotopic data obtained using secondary ion mass spectrometer in a pristine type B CAI from Efremovka (CV~3.1-3.4). Isotopic records of ^{7}Be, ^{10}Be and ^{26}Al in a type B CAI from Efremovka (E40) allow to make following very important inferences: (1) Nascent Sun underwent *multiple episodes* of enhanced magnetic activity (2) the *later episode* of enhanced irradiation occuring at the end of "class I" stage of pre-main sequence evolution was *more intense* (3) *Irradiation* is the *prime source of ^{7}Be* and also ^{10}Be. An intense irradiation by a super flare (X-ray luminosity $L_x \approx 10^{32}$ ergs) during the terminal class I stage of a CI (carbonaceous ivuna ≈ solar) composition precursors near the reconnection region for about an year can concurrently explains the isotopic properties (^{7}Be, ^{10}B, ^{26}Al), morphology (texture, modal grain sizes), and petrology (mineral compositions) of CAI, along with preservation of faster diffusing lithium isotope records.

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