Search for enhanced alpha preformation in the N=Z+1 nuclei ^{113}Ba, ^{109}Xe, ^{105}Te

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Since the initial discovery of the α–decay branches for ^{107,108}Te, the prospect of very fast α–decay for light Te, Xe, and Ba nuclides has stimulated the study of other α emitting nuclides in the mass region beyond ^{100}Sn [1,2,3]. α–decay width enhancements relative to ^{212}Po decay are anticipated because the protons and neutrons of the Te, Xe, and Ba nuclides occupy the same orbitals beyond double magic ^{100}Sn, enhancing preformation, as contrasted to ^{212}Po whose protons and neutrons lie in different orbitals.

Recently, α–decay of ^{114}Ba (N=Z+2) was reported at GSI [2]. A search was made for ^{113}Ba but not found, perhaps due to the time needed for the ISOL separation process used there, 10s of milliseconds. In contrast, the time needed for "in-flight" separation at the Argonne Fragment Mass Analyzer (FMA) is a few microseconds, making the prospect of finding a short lived ^{113}Ba and its decay products more likely. We report here on a search for the ^{113}Ba –> ^{109}Xe –> ^{105}Te –> ^{101}Sn α–decay chain performed at the fragment mass analyzer (FMA) at Argonne National Laboratory.

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