

MATERIALS SCIENCE

Premium Edit

Pyrochlore is a mineral that preferentially~~preferably~~ incorporates large amounts of Pu, U (up to 30 wt%wt)~~wt~~, and ThoriumTh (up to 9 wt%wt) into its structure [1-4].

~~Pyrochlores structure is the primary consideration as immobilization barriers for utilization of excess weapons-grade plutonium and other radioactive elements [5-7].~~

Pyrochlores exist~~exists in nature~~ as large~~huge~~ polyhedra with coordination numbers ranging from 7 to~~8~~; this which makes them capable of accommodating~~hold~~ a wide range variety of radio-nuclides such as ~~(e.g., Pu, U, Ba, and Sr, etc.)~~, as well as neutron poisons~~poison~~ such as ~~(e.g., Hf and Gd)~~ [8]. As a

result, the pyrochlore structure is the primary consideration as immobilization barriers for utilization of excess weapons-grade Pu and other radioactive elements [5-7]. Owing~~Due to their~~ their high radiation tolerance, pyrochlores are~~these are~~ largely used as combined inert matrix fuel forms and waste forms for the “burning” and final disposal~~disposing of~~ the major actinide Pu and the minor actinides [8].

Rare earth (RE) titanate pyrochlores ($RE_2Ti_2O_7$, where RE = Sm-Lu, or Y) have potential applications as solid electrolytes and mixed ionic/electronic conducting electrodes [9], catalysts [5], and ferroelectric/dielectric device components [11-13]. Rare Earth (RE, also known as lanthanides) titanate pyrochlore ($RE_2Ti_2O_7$, where RE = Lu-Sm, or Y) could be adopted.

Comment [A1]: An element name and the corresponding symbol are not to be treated as an abbreviation and its spelled-out form. Either the name or the symbol can be used consistently in the text; for example, silicon is referred to by its name or its symbol Si, but not as "silicon (Si)."

Comment [A2]: I have shifted this sentence to after the next sentence, since it is logical to first present all the characteristics of pyrochlores before mentioning the applications that these characteristics enable.

Comment [A3]: I have used "poison" assuming that you mean a substance with a large neutron absorption cross-section.

Comment [A4]: The meaning of this part of the sentence is not entirely clear. Do you mean “is the prime candidate for use as a barrier for the immobilization of excess weapons-grade Pu and other radioactive elements”?

Comment [A5]: Do you mean “both inert matrix fuel forms and waste forms” or “a combination of inert matrix fuel forms and waste forms”? Please revise accordingly.

Comment [A6]: I have added this phrase since the next part of the sentence mentions minor actinides.

Comment [A7]: Please consider providing a few examples of the minor actinides being referred to here.

Comment [A8]: I have made this change because “Sm to Lu” would be the correct logical order in terms of the atomic numbers of the elements in this range.

Comment [A9]: Academic publications following the Vancouver system of citations usually require the in-text citations to be included in numerical order. Please check this and include the citation of reference 10 before reference 11 here, or renumber the references to maintain numerical order.