s5.m19.o5 **Crystal Structures of Double Ceasium-Zirconium And Barium-Zirconium Orthophosphates.** Elena Gobetchia[a], Yurii Kabalov[a], Vladimir Pet'kov[b], Maxim Sukhanov[b], [a]*Faculty of Geology, Moscow State University, Lninskiey Gory, Moscow, 119992, Russia,* [b]*Chemical Department, Nizhni Novgorod State University, Nizhni Novgorod, 603950, Russia. E-mail: elgob@mail.ru*

Keywords: Phosphates; X-Ray Diffraction; Crystal Structures

The phosphates having frameworks $\{[L_2(PO_4)_3]^{p-}\}_{3\infty}$ formed by share-linked LO_6-octahedra and PO_4-tetrahedra are members of wide class of inorganic phosphates which can be used as ceramic materials with different functionalities. The $NaZr_2(PO_4)_3$ (NZP) structural type [1] is widely distributed among them. The crystal chemical formula of the phosphates with NZP-type structure, related to mineral kosnarite $KZr_2(PO_4)_3$ [2,3], is $(M1)_{0\rightarrow1}(M2)_{0\rightarrow3}\{[L_2(PO_4)_3]^{p-}\}_{3\infty}$, where $(M1)_{0\rightarrow1}$ and $(M2)_{0\rightarrow3}$ are types of extraframework cation positions in holes with the indications of position numbers and L is the framework position. In this work tow compounds of this type were recently studied by x-ray diffraction. $CsZr_2(PO_4)_3$ and $Ba_{0.5}Zr_2(PO_4)_3$ were synthesized by sol-gel technique and the crystal structures of $CsZr_2(PO_4)_3$ and $Ba_{0.5}Zr_2(PO_4)_3$ were solved using x-ray powder diffraction data and Rietved method in space groups R-3c and R-3 respectively. These structures are based on three-dimensional mixed framework of corner-sharing PO_4-tetrahedra and ZrO_6-octahedra and can be best described in terms of $[Zr_2(PO_4)_3]$ structural units composed of two ZrO6-octahedra linked to each other though three PO_4-tetrahedra. The tendencies in the behavior of the unit cell parameters in series of $MZr_2(PO_4)_3$ (M = Li, Na, K, Rb, Cs) and $M_{0.5}Zr_2(PO_4)_3$ (M = Ca, Sr, Ba) phases are interpreted.

[1] Hong H.Y.-P. (1976). *Mat. Res. Bull*. **11**(2), 173-182.
[2] Sljukic M., Matkovik B., Prodic B., Anderson D. (1969). *Z. Kristallog*. **130**, 148-161.
[3] Brownfield M. E., Foord E. E., Sutley S. J., Botinelly T. (1993) *Am. Miner.* **7**, 653-656.

s6.m20.o1 **The Quest for Logics for the Crystallization of Sensitive, Heterogeneous and Unstable Complexes.** Tamar Auerbach and Ada Yonath *Structural Biology, Weizmann Institute, Rehovot, Israel*. *E-mail: ada.yonath@weizmann.ac.il*

Keywords: Crystallization; Ribosomes; Complexes

Ribosomes, the universal cellular organelles catalyzing the sequential polymerization of protein according to the genetic code, are unstable giant protein/RNA assemblies, built of two unequal subunits that associate upon the initiation of protein biosynthesis. In prokaryotes, the large subunit ($1.5x10^6$ Dalton) contains two RNA chains (3000 nucleotides total) and up to 35 proteins. The small subunit ($8.5x10^5$ Dalton), contains one RNA chain (over 1500 nucleotides) and around 20 proteins.

Crystallization of ribosomal particles was found to be associated with challenging demands originating from the ribosomes enormous size; their complexity; their natural tendency to deteriorate and disintegrate; and their heterogeneous multi-conformations populations, resulting from their functional mobility. Assuming that ribosomal particles isolated from relatively robust organisms would deteriorate less during preparation, thus providing more homogenous starting materials for crystallization, we initiated the usage of halophilic, thermophilic and radiation-starvation resistant bacteria as ribosomal sources. Indeed, so far the only crystals leading to high-resolution structures are of ribosomal particles from extreme halophiles, thermophiles and the mesophile, *Deinococcus radiodurans*, which can be categorized as the "ultimate survivor".

To obtain high quality data pre- and post crystallization procedures were designed, ensuring the determination of the functionally relevant conformations. As homogeneity was found to play a key role in governing crystal quality, systematic searches were perfumed for establishing conditions for obtaining preparations with fully defined chemical compositions. These efforts included identification of variables essential for optimized functional activity, such as cell growth media and purification procedures.

We found that maintaining environmental properties essential for high functional activity within the crystals yield complete well-ordered structures, whereas deviations from such environment led to structures in which almost all functionally relevant features are disordered. Consequently, the high resolution structure of functional relevant complexes of *D. radiodurans* large ribosomal subunit revealed that the ribosome is a ribozyme providing positional, rather than chemical, catalysis, and that proper substrate positioning, dominated by remote interactions, is mandatory for efficient amino acid polymerization.