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O.S.B.1.

CLATHRATE TYPE I THERMOELECTRICS: $Ba_8M_x\square_y\{Ge,Si\}_{46-x-y}$ M=Mn,Fe,Co,Pd,Pt,Cu,Ag,Au,Zn

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The paper focuses on a systematic study of clathrate formation, clathrate structures, bonding and structure-property relations in clathrate type I materials $Ba_8M_x\square_yGe_{46-x-y}$. In most of these solid solutions ($0<x<8$; $y<3$) clathrates with increasing x and simultaneous decrease of y tend towards a metal-insulator transition. In this context the validity and shortcomings of the Zintl concept for clathrates will be outlined. Via careful tuning of composition high Seebeck effects of positive and negative sign can be achieved. The correlations obtained, although not complete for many systems, may provide useful in defining compositional regions of interest for further search for novel clathrate materials with interesting thermoelectric properties. Intelligent nanostructuring will be essential in increasing ZT.

O.S.B.2.

NANOSTRUCTURED MATERIALS FOR OPTOELECTRONIC APPLICATIONS

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New way to improve the surface properties of the inorganic and organic materials via nanotubes treatment process has been shown. It has been testified that the surface mechanical hardness of the MgF_2, LiF, etc. materials can be increased up to 3-10 times under the conditions of the spectral range keeping. Some simple model to explain the results has been discussed. As an additional, some features of transparent conducting ITO contacts modified with surface electromagnetic waves have been found. The data presented in the current paper testified that these nano-objects-optimized materials could be used as new elements and new laser window for the UV and IR spectral range.