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PREPARATION AND CHARACTERIZATION OF ZNSIP2 AND ZNGEP2
SINGLE CRYSTALS(U) BROWN UNIV PROVIDENCE RI DEPT OF
CHEMISTRY G YAO ET AL. 24 JAN 86 N00014-85-K-0177

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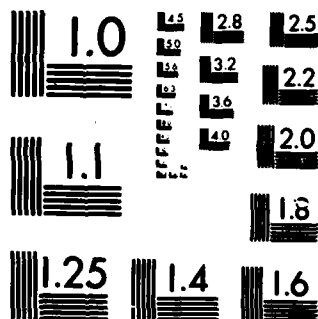
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19 ABSTRACT (Continue on reverse if necessary and identify by block number) Single crystals of $ZnSiP_2$ and $ZnGeP_2$ have been grown by several techniques and their electronic and optical properties were compared. It was found that Fe(III) could not be substituted for equal amounts of Zn(II) and Ge(IV) in the II-IV-V ₂ chalcopyrites. However, 0.5 atomic percent of Mn(II) was successfully substituted in the structure for Zn(II). <i>Germanium Compounds, Zinc Compounds, Gallium Compounds</i>			
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Aaron Wold
Department of Chemistry
Brown University
Providence, RI 02912
Contract N00014-85-K-0177

This annual report covers the period from March 1, 1985 to January 31, 1986. The report is based on a technical report which is being sent out to those on the distribution list as required.

The work during the past year has dealt with the preparation and characterization of ZnSiP_2 and ZnGeP_2 single crystals. ZnSiP_2 crystals were grown from a zinc flux and by chemical vapor transport using chlorine as the transport agent. ZnGeP_2 was grown by chemical vapor transport and from the melt by a modified Bridgman method. The stability of ZnGeP_2 towards oxidation was determined by heating these compounds in a flowing oxygen stream and determining the change in weight during the heating period. The results indicate that ZnGeP_2 is stable up to 740°C . ZnSiP_2 also begins to oxidize at approximately 740°C but the rate of its oxidation is much slower than that of ZnGeP_2 . From the infrared spectral response, absorption bands for ZnSiP_2 were observed at approximately 10 and 11.5 μm and for ZnGeP_2 at 13 μm . It has been reported that these absorption bands are due to lattice vibrations. In order to demonstrate that these bands were not caused by P-O bonds, ZnGeP_2 samples were heated in a flowing oxygen stream at 300°C for 2 hours. The spectrum of the treated samples was exactly the same as the untreated crystals. At present, attempts are being made to substitute tin for germanium into ZnGeP_2 . The extent of substitution into the II-IV-V₂ chalcopyrites appears to be limited and it will be the purpose of the next reporting period to ascertain the nature and degree of such substitutions.



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