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Effect of spin-orbit coupling on excitonic levels in layered chalcogenide-fluorides ANDRIY ZAKUTAYEV, ROBERT KYKYNESHI, JOSEPH KINNEY, DAVID H. MCINTYRE, GUENTER SCHNEIDER, JANET TATE, Department of Physics, Oregon State University — BaCuChF (Ch=S,Se,Te) comprise a family of wide-bandgap p-type semiconductors. Due to their high transparency and conductivity, they have potential applications as components of transparent thin-film transistors, solar cells and light-emitting devices. Thin films of BaCuChF have been deposited on MgO by pulsed laser deposition (PLD). Solid solutions $BaCuS_{1-x}Se_xTeF$ and $BaCuSe_{1-x}Te_x$ have been prepared by PLD of alternating thin BaCuChF layers. All films were deposited at elevated substrate temperatures. They are preferentially c-axis oriented, conductive and transparent in the visible part of the spectrum. Double excitonic peaks have been observed in the absorption spectrum of these films in the temperature range from 80 to 300K. The separation between the peaks in the doublet increases with the increase of atomic mass of the chalcogen. It also increases with the increase of the heavy chalcogen component x in the solid solutions. This separation most likely is caused by the effect of spin-orbit coupling in the chalcogen atoms on excitonic levels in BaCuChF.

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