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Method for obtaining a multispectral grade of zinc sulfide

R.V.Chkalov, M.N.Gerke, D.A.Kochuev, D.G.Chkalova
Vladimir State University, Vladimir, Russia
e-mail: j.larenax@gmail.com

In the initial state, being grown using traditional CVD technology, ZnS has insufficient transparency in the visible and infrared ranges, which is unacceptable for a number of applications. It is possible to improve the properties of polycrystalline zinc sulfide during its subsequent processing by the method of high-temperature isostatic pressing (HIP).

The qualitative result of processing CVD-ZnS samples obtained at various pressing parameters is shown in Fig. 2.

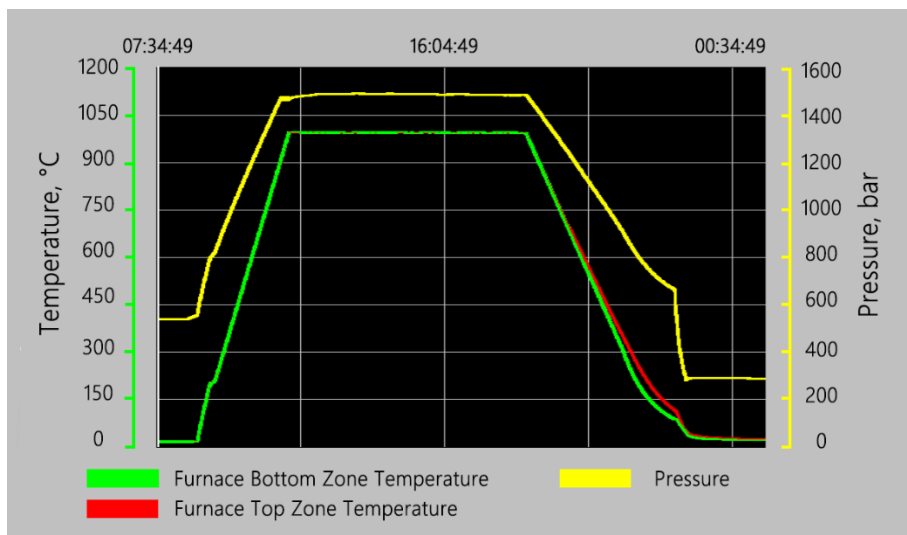


Fig. 1. Typical pressure and temperature curves of HIP.

To carry out hot isostatic pressing a **commercial HIP** system was used, located in the **Vladimir State University**, which has the following characteristics: useful diameter of the high-pressure chamber – **250 mm**; useful chamber height – **350 mm**; maximum working pressure – **2500 bar**; maximum operating temperature – **2000 °C**; temperature gradient in the furnace – no more than 3 °C; working environment – high-purity argon 99.998.

The pressing procedure is standard. Step-by-step loading of samples into a high-pressure vessel, its evacuation, filling with a working gas at normal temperature, then temperature rise at a given rate, holding at fixed temperature and pressure parameters, cooling at a given rate to a temperature of 300 °C, natural cooling, pressure release, opening the vessel and raising cages.

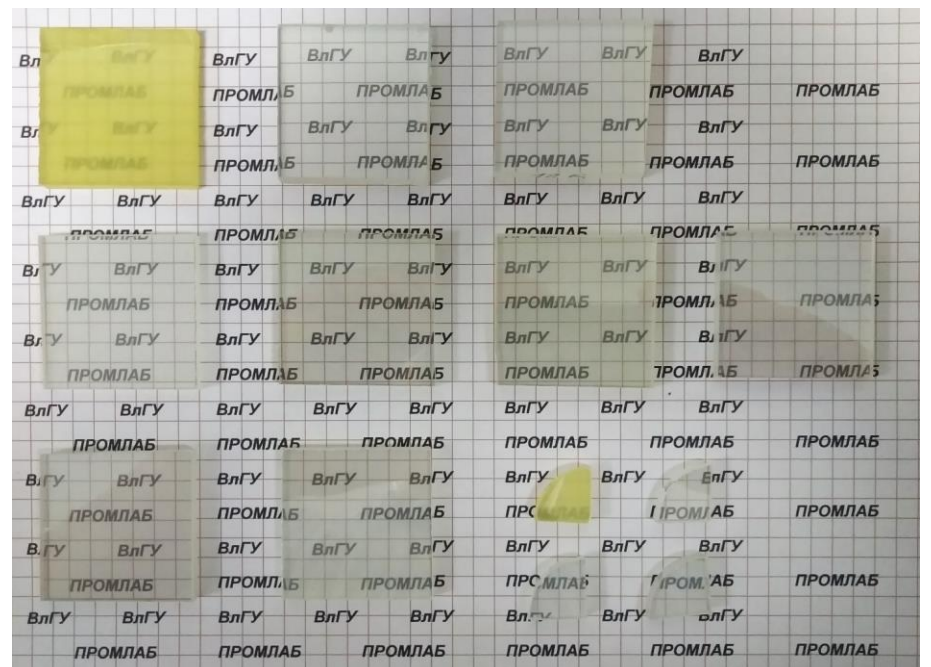


Fig. 2. The photo of CVD-ZnS samples. Non-HIP treated control samples of starting material are located in the upper left corner. The grid step is 5 mm.

Obviously, HIP treatment leads to an increase in transparency of the samples in visible range. Zinc sulfide is transitioning from FLIR grade into Multispectral grade.

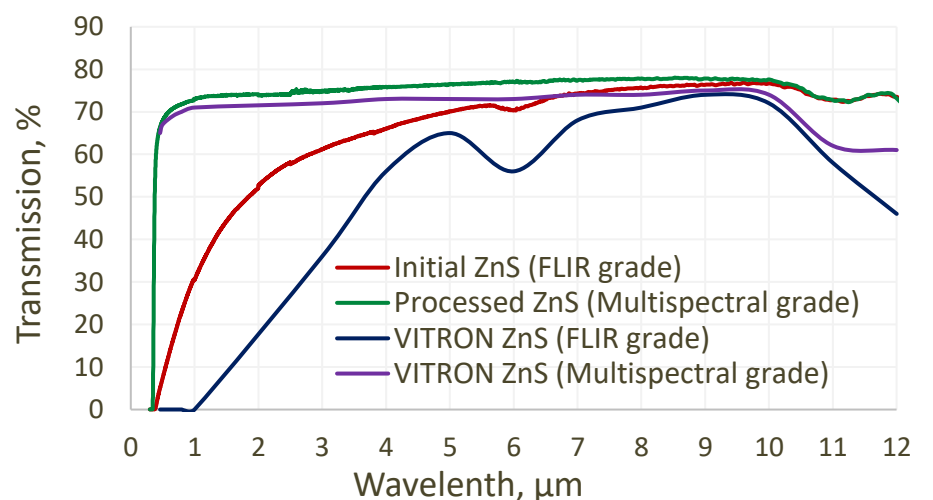


Fig. 3. Spectral transmission curves of zinc sulfide samples.