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## **GREENOCKITE CdS FROM THE SILESIA-CRACOW Zn-Pb ORE DEPOSITS**

**Abstract.** The occurrence of greenockite CdS in the Silesia-Cracow Zn-Pb ore deposits, mentioned just in 19th century, has been most probably for the first time documented here by chemical analysis and morphological observation.

*Key-words:* greenockite, cadmium sulphide, Silesia-Cracow ore deposits

### INTRODUCTION

The occurrence of cadmium sulphide (greenockite) in the Silesia-Cracow Zn- Pb ore deposits was first mentioned by Traube (1888). He observed its lemon yellow coatings on a red galmei in a deposit in the vicinity of Bytom (Beuthen, Apfelgrube), but gave no more detailed information. During the 20<sup>th</sup> century the yellow efflorescence on partly weathered Zn sulphide ores were sometimes observed (pers. commun.), however — according to the present authors knowledge — nobody published the results of their investigations (see e.g. Żabiński 1960; Harańczyk 1965).

In this note the results of SEM morphological and EDS chemical investigation of greenockite efflorescence coming from a Zn-Pb ore mine of the Olkusz region are presented.

### EXPERIMENTAL

The morphology of the mineral and its chemical composition were examined using field emission scanning electron microscope (HITACHI S-4700) equipped with an energy dispersive spectrometer (NORAN Vantage), accelerating voltage being 20 kV.

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The sample was coated with the carbon film. The content of cations was evaluated according to the “standardless” procedure of calculation (i.e. using standards from the software library supplied by the manufacturer).

## RESULTS AND DISCUSSION

The cadmium sulphide examined occurs in the form of fine-grained (powder), yellow efflorescence on a partly oxidized zinc sulphide, hosted by the ore-bearing dolomite (Phot. 1).

EDS chemical analysis was performed in several spots of the yellow efflorescence, CdS being always the dominant phase. Figure 1 represents EDS spectrum of the “purest” CdS, with small admixture of other elements (Zn, Mg, Al, Si) coming mostly from the “background” minerals. Weight- and atomic contents of the elements mentioned, recalculated to 100%, are shown in Table 1.

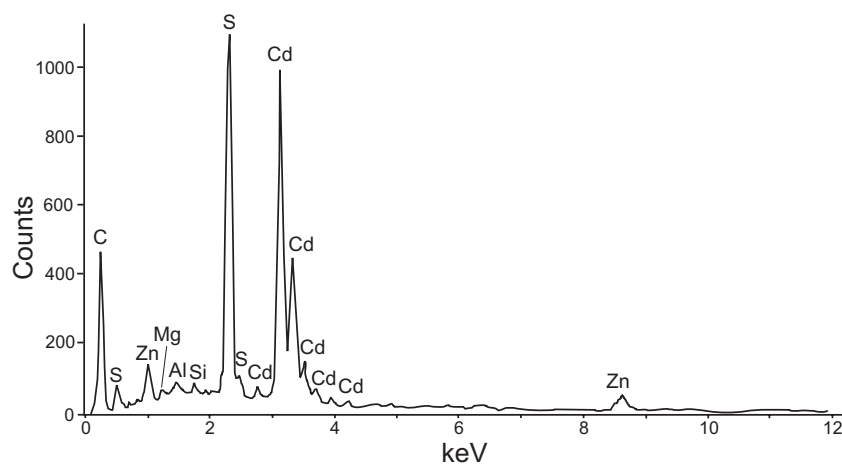


Fig. 1. EDS spectrum of the “purest” CdS

TABLE 1

Chemical composition of greenockite from the Olkusz region

Element	Wt. %	Atomic %
Cd	71.30	44.23
S	20.83	45.31
Zn	6.58	7.02
Mg	0.51	1.47
Al	0.33	0.85
Si	0.45	1.12
Total	100.00	100.00

The morphology of CdS crystals is presented on Photos. 2a and 2b. The aggregates of tiny crystals are clearly visible, the individual microliths displaying a tabular habit. This observation strongly confirms the supposition that it is the common hexagonal cadmium sulphide polymorph ( $\beta$ -CdS greenockite) rather than its rare cubic modification ( $\alpha$ -CdS hawleyite) (Strunz 1978).

The origin of greenockite is most probably connected with its lower solubility in an acid solution in comparison with zinc sulphide, which initially hosted cadmium (Polański 1988). Greenockite can, therefore, precipitate from a sulphuric solution immediately after partial oxidation and dissolution of Zn ore.

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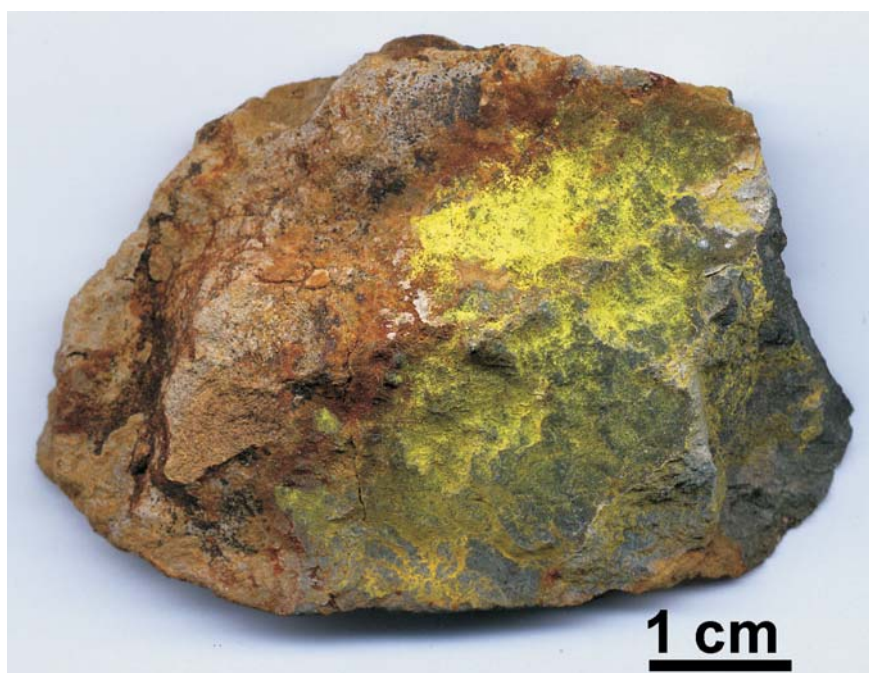
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*Anna ŁATKIEWICZ, Witold ŻABIŃSKI*

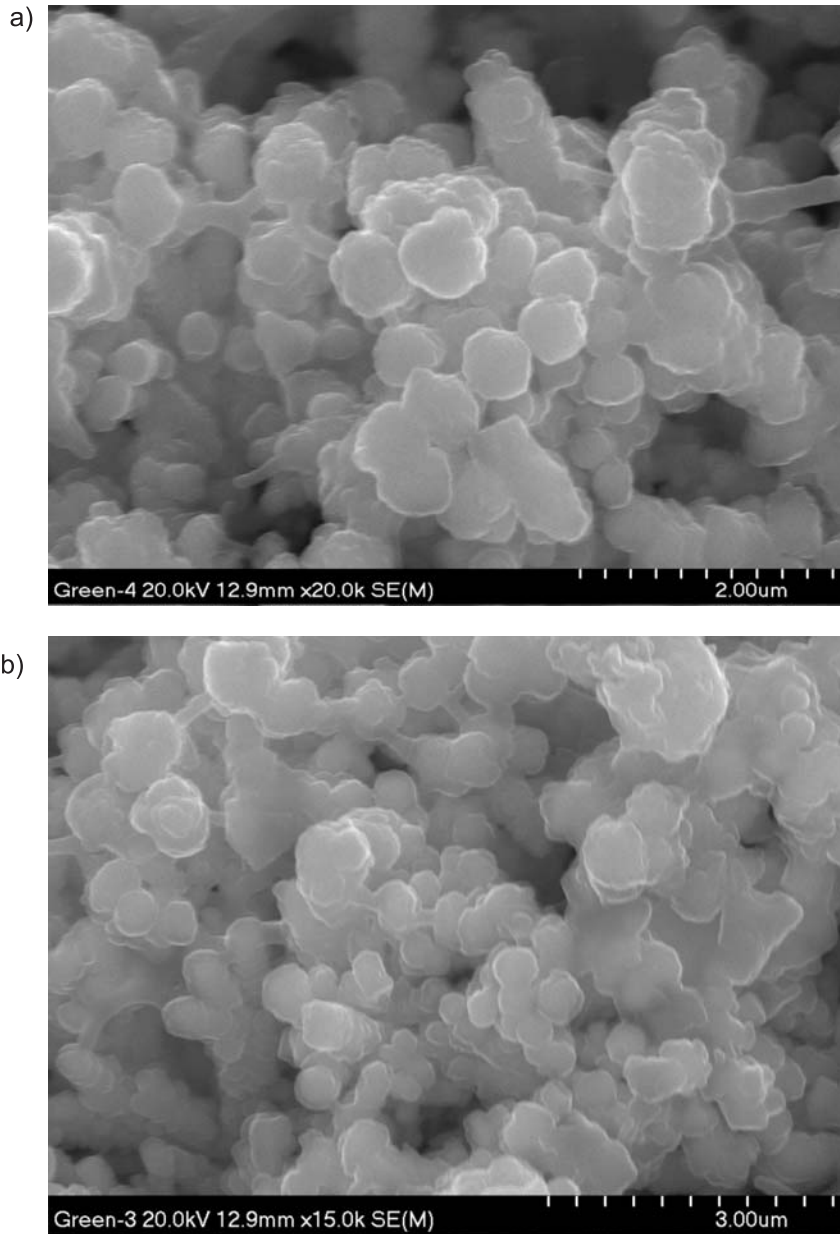
#### GREENOCKIT CdS ZE ŚLĄSKO-KRAKOWSKICH ZŁÓŻ RUD Zn-Pb

##### Streszczenie

Wzmianka o występowaniu greenockitu w jednej z kopalń rud Zn i Pb w rejonie Bytomia pochodzi jeszcze z XIX wieku (Traube 1888). W ciągu XX stulecia w ustnych przekazach wspomniano o napotkaniu żółtych nalotów na wietrzejących siarczkowych rudach cynku, jednak nikt — według stanu wiedzy autorów tego komunikatu — nie opublikował wyników badań tych nalotów. Przedmiotem tej notatki są wyniki badań żółtych nalotów napotkanych na wietrzejących rudach Zn w jednej z kopalń rejonu Olkusza (Fot. 1). Za pomocą elektronowego mikroskopu skaningowego z przystawką EDS wykazano, że badany nalot jest niemal czystym siarczkiem kadmu, a tabliczkowata forma jego mikrokryształów (Fot. 2a, b) przemawia bardziej za heksagonalną modyfikacją siarczku ( $\beta$ -CdS greenockit) niż za jego rzadkim polimorfem regularnym ( $\alpha$ -CdS hawleyit).



Phot. 1. Greenockite coating on partly oxidized zinc ore



Phot. 2. Aggregates of greenockite crystals.

Whole scale (bottom-right): a — 2  $\mu\text{m}$ , b — 3  $\mu\text{m}$