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Platy dolomite crystals in Zechstein 2 dolostones from Scharzfeld (SW Harz): Combined Cathodoluminescence and EBSD investigations

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Cathodoluminescence (CL) microscopy revealed strip-shaped dolomites in the uppermost part of the Zechstein 2 dolostones from Scharzfeld (SW Harz Mountains). These dolomite "strips" are the first dolomite generation of the sequence and they are placed homoaxial in the nucleus of dolomite rhombs with a total size of 50-100 μm. Both of the dolomite generations show different properties of extrinsic CL activated by Mn^{2+}. Whereas the CL colour of the first dolomite generation is yellow, the second is red. This visual observation was confirmed by use of the High Resolution Spectroscopy of Cathodoluminescence Emission (HRS-CL) established at Bochum: The spectra of the dolomites revealed an overlap of the two CL broad bands of Mn^{2+} in the Mg-position (red CL, λ = 656 nm) and in the Ca-position (yellow CL, λ = 575 nm). The spectroscopic analyses of yellow luminescing dolomites revealed a relation of "Mn^{2+} in Ca-position" to "Mn^{2+} in Mg-position" of approx. 2:3. In contrast to that, spectra of the red luminescing dolomites only show a relation of $<$1:3.

In order to obtain information about the crystallographic orientation of the two dolomite generations, the new method of electron backscatter diffraction (EBSD) was applied using a LEO 1530 Gemini scanning electron microscope (SEM) in combination with an EBSD system by HKL Technology. The polished thin sections already prepared for CL-investigations were chemo-mechanically etched to prepare an undisturbed surface. Slight morphological variations made visible using a forescatter-detector are due to differences in surface hardness of distinct grains. The more resistant dolomite crystals cropping out at the surface surrounded by calcites could be recognized easily by this method. To determine the crystallographic orientation of the

dolomite the corresponding EBSD patterns were recorded and subsequently processed by a computer. The results were plotted in stereographic pole figures. The orientation of the c-axis of both dolomite generations was confirmed to be identical and the aforementioned dolomite “strips” could be identified unequivocally as dolomite plates parallel to {0001}.

Dolomite crystals with yellow CL-emission have been reported by several authors in the last decade, while platy dolomite crystals are only documented rarely. Regarding the depositional environment of both of the dolomite properties, yellow CL and platy crystal shape seem to occur predominantly in sediments deposited under evaporitic influence.