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Formen, die den verbliebenen Kationen und Wassermoleküle günstige Koordinationsmöglichkeiten bieten. Unter Wasserabgabe reduziert sich das Zellvolumen um 11.2% und die Gitterkonstante verkleinert sich auf 33.88 Å (5). Bei weiterer Temperaturzufuhr kollabiert die Gerüststruktur irreversibel.

Jetzt wurde das Verhalten der Paulingit-Struktur unter tiefen Temperaturen kristallographisch untersucht. Einkristalle von Paulingit-Ca,K (Ritter, Oregon, USA) wurden auf einem Diffraktometer (CuKα, 2.3 kW, MAR345) im N_2-Strom bis auf 100K gekühlt und Beugungsbilder in ϕ-Scans aufgenommen. Die Gitterkonstante reduziert sich dabei bis auf 34.245(5) Å, was einer Abnahme des Volumens um 7.4% entspricht. Die Deformation der Gerüststruktur durch Kippen und Drehen der Tetraeder ist in der reduzierten Zelle in der Raumgruppe Im3m unter Beibehaltung plausibler T-O-T Winkel nicht mehr möglich, so dass auch hier schon die Umwandlung in die Untergruppe I-43m erfolgt ist. Dabei deformieren vorher annähernd kreisförmige S8R zu in Richtung gestreckten, elliptischen Ringen. Die Verfeinerung des Strukturmodells ergibt mit isotropen Auslenkungskoeffizienten eine Übereinstimmung von R=0.0895 und S=1.2. Die Reduktion des Zellvolumens wird aber in erster Linie durch die trockene Umgebungsluft bei den Messungen hervorgerufen, auf die der Zeolith sofort mit Wasserabgabe reagiert. Bei Raumtemperatur (293 K) kann man durch den trockenen N_2-Strom reversible bereits eine Reduzierung der Gitterkonstante auf 34.345(6) Å hervorrufen, also eine Anpassung der Struktur um 6.6 Vol.-% auf die Wasserabgabe. Die Untersuchungen zeigen also nicht nur das Tieftemperaturverhalten des Paulingits, sondern auch, wie empfindlich kollapsible Zeolithstrukturen auf Änderungen der Luftfeuchtigkeit reagieren.

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MS15-T8
Highly symmetric complex intermetallics

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A growing number of structurally highly complex intermetallic phases is being discovered and described with the emergence of new crystallographic methods. We are still not able to understand, why unit cells containing hundreds or even thousands of atoms are being formed by simple, binary and ternary metallic compounds. To approach this important question, we are working on a systematization of complex intermetallics, starting with the highest-symmetric lattice, i.e. the cubic face-centered structures. There is a bigger group of phases with approximately 400 atoms per unit cell - 43 reported structures -, which crystallizes in only two different space groups and can be roughly assigned to a common aristotype structure. The few structures with even bigger unit cells - 11 phases with around 1000 atoms per unit cell, not mentioning the even bigger Al-Cu-Ta compounds [1,2] - show a slightly broader structural variety but can also largely be traced back to some common geometrical characteristics. We try to understand all of these structures in terms of the cluster approach, describing them as packings or coverings of highly symmetric building blocks. In addition, features of the average structure and findings from first-principle studies are discussed with respect to complexity and phase formation.

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MS16-T1
U-Pb dating of scheelite by LA-SF-ICP-MS constrains the Variscan age of the Felbertal tungsten deposit

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The Felbertal scheelite deposit is one of the biggest tungsten mines in the world (annual capacity about 0.4 Mt/yr; total production until 2009: 12.9 Mt at 0.5% WO_3). It has long been regarded as the type locality of stratiform-stratabound scheelite deposits. Syngenetic exhalative hydrothermal as well as granite-related epigenetic models were proposed to explain ore formation. In this contribution we present a new *in-situ* U-Pb age for scheelite obtained by LA-SF-ICP-MS allowing us to decipher the timing of the oldest stage of scheelite ore; this new age is crucial for unravelling the ore genesis. The Felbertal deposit is situated in the lower parts of the Habach Complex, an Early Cambrian to Ordovician sequence of metavolcano-sedimentary rocks with ophiolitic to arc sequence characteristics. A chemically unusual fractionated W-bearing granite, the K1 orthogneiss, was emplaced in the Early Carboniferous (336 ± 19 Ma) into the western ore zone of the deposit. Several economic ore bodies are spatially associated with this orthogneiss, that is not exposed at the surface. Economic scheelite mineralisation is associated with SiO_2-rich lithologies. It includes well foliated fine-grained scheelite-quartz ores ("Quarzitisches Scheelitreicherz") that were the main target of former mining in the eastern ore zone, as well as deformed quartz veins (Quartz 1) and stockwork like mineralisation. The ore deposit was affected by metamorphism (up to the lower amphibolite facies) and tectonics during the Variscan (~330 Ma) and Alpine (~30 Ma) orogenies. Trace element analyses using LA-QP-ICP-MS techniques, controlled by cathodoluminescence (CL) images, confirmed the previously established classification of scheelite stages. Scheelite 1 is preserved as relict cores in fine-grained scheelite in the foliated scheelite-quartz ores. It preserves delicate oscillatory growth zoning, is characterised by flat wing-shaped REE patterns, and contains between 50 to 1120 ppm U. In-situ U-Pb dating by LA-SF-ICP-MS of Scheelite 1 yielded a concordia age of 335.5 ± 4.6 (2 sigma). This new age constrains the timing of scheelite formation of the "Scheelitreicherz" for which an Early Cambrian age was previously assumed. These foliated fine-grained scheelite-quartz ores are therefore not exhalites but are re-interpreted as mylonitic ores formed during the Variscan orogenic cycle. Within the uncertainty this new age is indistinguishable from the 336 ± 19 Ma emplacement age of the K1 orthogneiss (Eichhorn et al., 1999). The new scheelite age is inconsistent with previous genetic models, which proposed either syngenetic ore formation in the Cambrian or two stages of epigenetic ore formation, the first in the Cambrian and the second in the Early Carboniferous (Eichhorn et al., 1999). The Felbertal scheelite deposit is best interpreted as a metamorphosed, syntectonic granite-related magmatic-hydrothermal ore deposit of exclusively Early Carboniferous age.

References
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