MGML infrastructure – recent highlights in the field of single crystal growth

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The main mission of MGML is to provide the broad scientific community with unique possibilities for comprehensive experimental studies of a wide collection of physical phenomena and properties of well-defined materials in various external conditions-see the MGML.eu.
MGML offers open access for external users to the instrument suite dedicated to materials synthesis and single crystal growth and measurements of a rich spectrum of physical properties of materials in a wide range of temperatures, magnetic and electrical fields, and hydrostatic uniaxial pressures.
MGML consists of two closely collaborating units: Material Growth and Characterization Laboratory (MGCL) and Material Properties Measurement Laboratory (MPML). Researchers interested in using the MGCL and MPML instrumentation are invited to submit experimental proposals via the User Portal.
The subject of the talk is to introduce the MGCL branch in which the wide scale of the single crystal growth methods is implemented. The developments and highlights in the field of single crystal growth will be demonstrated on several recently studied materials.
The intensive interest in Chemical Vapour Transport (CVT) method was initialized by systematic research of Van der Waals materials based on halides. In vdW halides, long-range ferromagnetic order can be preserved down to the single-layer limit which makes these materials very promising candidates in the field of spintronics. Transition metal trihalides are intensively studied in MGML [1–3].
The floating zone implemented in the last model of laser furnace produced by Crystal System Corp. (Japan) is another highly tasked method. In the cooperation of Crytur company, this method is tested in the field of production of scintillation materials based on YAG in conditions unattainable in the conventional Czochralski method. This method also produces a very unique single crystal based on actinides. The available high-quality single crystals are an essential condition for their research due to high magnetocrystalline anisotropy [4–7].
Significant scientific successes were also reached by the classical Czochralski method. Its use will be demonstrated on single-crystal research of actinide pure [8] or substituted systems [9].

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