# Single Crystal Studies of Charge Density Wave Physics in Quasi-1D Metals *R*$NiC_2$

Herwig Michor[1], Marta Roman[1,2], Maria Fritthum[1], Emilie Morineau[1], Lisa Reisinger[1], and Berthold Stöger[3]

[1]*Institute of Solid State Physics, TU Wien, A-1040 Wien, Austria*

[2]*Faculty of Applied Physics and Mathematics and Advanced Materials Center, Narutowicza 11/12, Gdańsk University of Technology, 80-233 Gdańsk, Poland*

[3]*X-Ray Center, TU Wien, A-1060 Wien, Austria*

Ternary carbides *R*$NiC_2$ (*R* = rare earths and Y) crystallize in the non-centrosymmetric orthorhombic $CeNiC_2$-type structure, space group Amm2. These compounds attracted attention, because of various interesting properties such as superconductivity, magnetism, multile charge density wave (CDW) transitions related to quasi-one-dimensional electronic features of *R*$NiC_2$, and finally, a complex interplay of CDW order and rare earth magnetism in *R*$NiC_2$ (see Ref. [1] for a review).

Here, we report on crystal growth, crystallographic characteristics explored via single crystal XRD, as well as magnetic, thermodynamic, and electronic properties studied by a variety of techniques revealing orientation dependent, anisotropic features of selected *R*$NiC_2$ single crystals. Based on heat capacity, thermal expansion and electrical resistivity studies, we analyse the nature of multiple CDW transitions occurring in *R*$NiC_2$ crystals (e.g., orthorhombic to incommensurate CDW and incommensurate to commensurate CDW transitions). We discuss their relations to electronic and crystal structure changes and, employing Clausius-Clapeyron and generalized Ehrenfest relations, we discuss resulting pressure and strain dependencies of the observed CDW phases.

*Financial support for M.R. by grant DEC-08/2021/IDUB/II.1/AMERICIUM of the AMERICIUM - 'Excellence Initiative-Research University' Program from the Gdańsk University of Technology is gratefully acknowledged.

[1] V. Babizhetskyy, B. Kotur, V. Levytskyy, H. Michor, Chapter 298: Alloy systems and compounds containing rare earth metals and carbon, in: J.-C.G. Bünzli, V.K. Pecharsky (Eds.), Handbook on the Physics and Chemistry of Rare Earths, Vol. 52, North-Holland, Amsterdam, pp. 1-263. (2017).