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First order CDW phase transitions in R₂Ir₃Si₅ (R = Ho, Er, Lu)

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R₂Ir₃Si₅ (R = Ho, Er, Lu) crystallize in the U₂Co₃Si₅ structure type at room temperature (orthorhombic space group Ibam) [1]. Upon cooling they undergo first-order charge-density-wave (CDW) phase transitions, as evidenced by anomalies with hysteresis in the temperature dependencies of the electrical resistivity (ρ), specific heat (C_p), magnetic susceptibility (χ), Seebeck coefficient (S) and thermal conductivity (κ) [1-4]. The CDW character of the low-temperature phases is corroborated by the appearance of satellite reflections at $q = (0.2495, 0.4973, 0.2483)$ in diffraction experiments [4,5]. Single-crystal x-ray diffraction has revealed that the incommensurate CDW is accompanied by a strong monoclinic lattice distortion, while the symmetry of the CDW phase is reduced to triclinic. Here, we discuss the microscopic mechanism of CDW formation on the basis of a superspace analysis of single-crystal x-ray diffraction data [4].

Acknowledgement: Single-crystal X-ray diffraction data were collected at Beamline P24 of PETRA-III at DESY, Hamburg, Germany.

References

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