particles [4,5], to the design of nonlinear photonic quasicrystals for optical frequency conversion [6].


**Keywords:** quasicrystals, soft matter, self assembly

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**Incommensurate Tiling in \(\eta'=\text{Cu}_{1-x} \text{Si}_{x} \text{Ge}\) Determined by Electron Diffraction**

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Despite its technological importance *e.g.* as a catalyst for the production of chlorosilanes used in semiconductor industry, \(\eta'-\text{Cu}_{1-x} \text{Si}\) has eluded correct structural description for decades due to the combination of a complex, two-dimensional incommensurately modulated structure, and difficulty to obtain large samples suitable for single crystal analysis.

We prepared small isolated platelets about 40 nanometres thick with composition \(\text{Cu}_{0.9} \text{Si}_{0.1} \text{Ge}_{0.8} \) by deposition of organometallic precursors (hexamethylidygermane \(\text{Ge}_3(\text{CH}_3)_6 \)) and ethyl silane \(\text{SiH}_2 \text{CH}_3 \)) on Cu substrate by the CVD method at the temperature of 500 °C.

Initial investigation of the samples revealed complex diffraction pattern with satellite reflections at incommensurate positions (Fig. 1a). The complex diffraction pattern is not a consequence of twinning, but it stems from one phase. This is evidenced by high-resolution TEM images (Fig. 1b,c). The data for structural investigation were collected by quantitative electron diffraction tomography coupled with precession electron diffraction on a Philips CM120 with LaB\(_6\) cathode operating at 120kV, equipped with a precession device SvingStar (NanoMegas). The structure was solved by the charge-flipping algorithm in superspace [2].

**Figure 1:** TEM observations. (a) Diffraction pattern of the zone [001]. (b) A Fourier-filtered scale-up of (c) showing clear non-periodic variation of the contrast. The basic unit cell is shown by the white rhombus.

**Keywords:** electron diffraction tomography, 5D structure, charge flipping

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**Dynamics of the inner tetrahedron in the ZnSc 1/1 quasicrystal approximant: experiment and simulation**

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We present a combined experimental and theoretical study of the dynamic of the inner tetrahedron in the ZnSc 1/1 periodic approximant to the quasicrystal. The structure of the approximant is described by a body centre cubic packing of the so-called Tsai type cluster [1].

The central part of this cluster is a tetrahedron, whose orientation is randomly distributed at room temperature [2]. At about 150 K, there is an order-disorder phase transition accompanied by a lattice distortion towards a phase of monoclinic symmetry [3]. In the low temperature phase, the tetrahedra are oriented in an anti-parallel manner along the (110) direction [4].

We present a detailed quasielastic neutron scattering study of the ZnSc approximant as a function of the temperature. The experiment un-ambiguously shows that the tetrahedra are dynamically moving above Tc, whereas they are locked-in below Tc. This will be compared to atomistic simulations using oscillating pair potentials [5] which shows the importance of the cluster distortion and resulting frustration in the dynamics of this complex systems.


**Keywords:** quasicrystals, dynamics, neutron scattering