## Contribution submission to the conference Regensburg 2025

**Hexagons on Rectangles: Epitaxial Graphene on Ru($10\bar{1}0$)** —
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The miniaturization of integrated electronics drives the demand for barrierless interconnects, with graphene-ruthenium structures emerging as promising candidates. We present an *in situ* study of the growth and electronic properties of graphene on rectangular Ru($10\bar{1}0$) grown by high-temperature carbon segregation. Using low-energy electron microscopy (LEEM), it is shown that graphene grows preferentially along the [$1\bar{2}10$] direction, forming micrometer-sized rectangular islands. Microspot low-energy electron diffraction ($\mu$LEED) reveals two predominant graphene orientations, rotated by 0° (R0) and 30° (R30), with indications for the formation of graphene nanoribbons in bilayer graphene/Ru($10\bar{1}0$). Microspot angle-resolved photoemission spectroscopy ($\mu$ARPES) shows that the Dirac cones remain intact in bilayer graphene with reduced n-type doping compared to graphene/Ru(0001), indicating a weaker interaction with the Ru($10\bar{1}0$) surface. These results highlight the influence of substrate symmetry and interactions on graphene properties and provide insights for engineering graphene beyond hexagonal substrates.

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