

## Fast Diffusive Behavior of Pb on Ge(111) at Low Temperatures During Island Formation

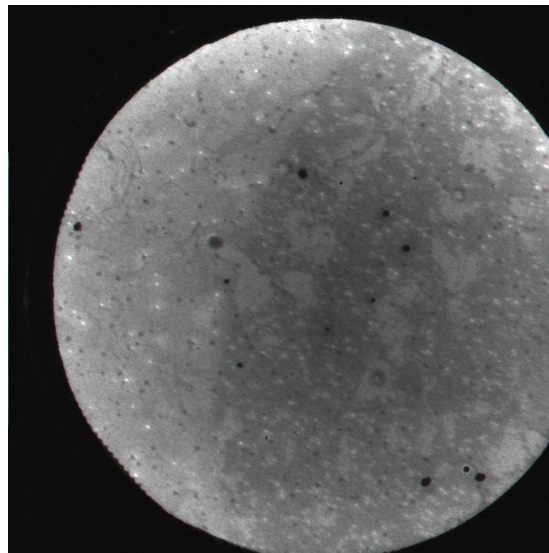
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Lead deposited on Ge(111) at low temperatures (210K) was found to show unusual collective diffusion behavior upon heating towards room temperature. As the sample was heated, Pb was seen diffusing from high coverage regions into a region of low Pb coverage, forming small islands (Fig. 1). Eventually the regions of low coverage filled with enough Pb to form a uniform layer. Similar behavior was seen with Pb on Si(111) at low temperatures, with island formation whose heights were determined by quantum size effects [1] as well as unusually fast diffusion speed [2]. We also present a first-principles study of the structure of Pb overlayers on Ge(111) using DFT calculations with respect to experimental observations of Pb/Ge(111) phases [3].



**Figure 1.** Pb/Ge(111) at 225K. Coverage is about 1.7ML. 10 $\mu$ m Field of View. The region of bright contrast has higher coverage of Pb than the region of dark contrast. Very small islands of Pb can be seen filling the region of dark contrast, shown as bright dots on the surface. The larger, bright-contrast features in the dark region are defects on the Ge(111) surface, and the black dots are defects in the microchannel plate.

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### References

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