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## ORAL PRESENTATION - Superheavy element 114 is a volatile metal

*Tuesday, September 18, 2012 10:40 AM (15 minutes)*

The experimental determination of chemical properties of element 114 (E114) is among the hottest topics in superheavy element research. A first experiment reported E114 to be highly volatile, and to form weak physisorption bonds with Au surfaces [1]. However, the large uncertainties of the measured adsorption enthalpy covered a wide range in volatility, which prevented the experiment from yielding an unambiguous answer concerning the chemical properties of E114. A noble gas-like behavior, representing a break in the trend in group 14 in the periodic table, would be in contradiction to many recent theoretical calculations, which predict a higher volatility and inertness compared to the lighter homolog Pb, but a stronger metallic behaviour compared to Cn [2-4].

We have performed a gas phase chemical study of E114 using a combination of the TransActinide Separator and Chemistry Apparatus (TASCA) to isolate single atoms of E114 [5], and the Cryo-Online Multidetector for Physics and Chemistry of Transactinides (COMPACT) [6], a gas chromatography detector suitable for studying the interaction of single atoms with metallic Au surfaces. The setup allowed studying elements covering a broad range in volatility, from the non-volatile heavy metal Pb to the noble gas Rn, at a very low background level.

In our experiment, the volatility of five elements was studied: the two superheavy elements E114 and Cn ( $Z=112$ ), their lighter homologs Pb and Hg, and the noble gas Rn. Two element 114 decay chains, one from  $^{288}114$  and one from  $^{289}114$ , have been detected and indicate E114 to adsorb on Au surfaces at room temperature [7]. The interaction of element 114 with Au is at least as strong as that of Cn, in contradiction with a previous experiment [1]. Our results show element 114 to be the least reactive member of group 14, but still a metal.

### References

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