Scientists unlock secrets of aromatic molecules' interaction with gold

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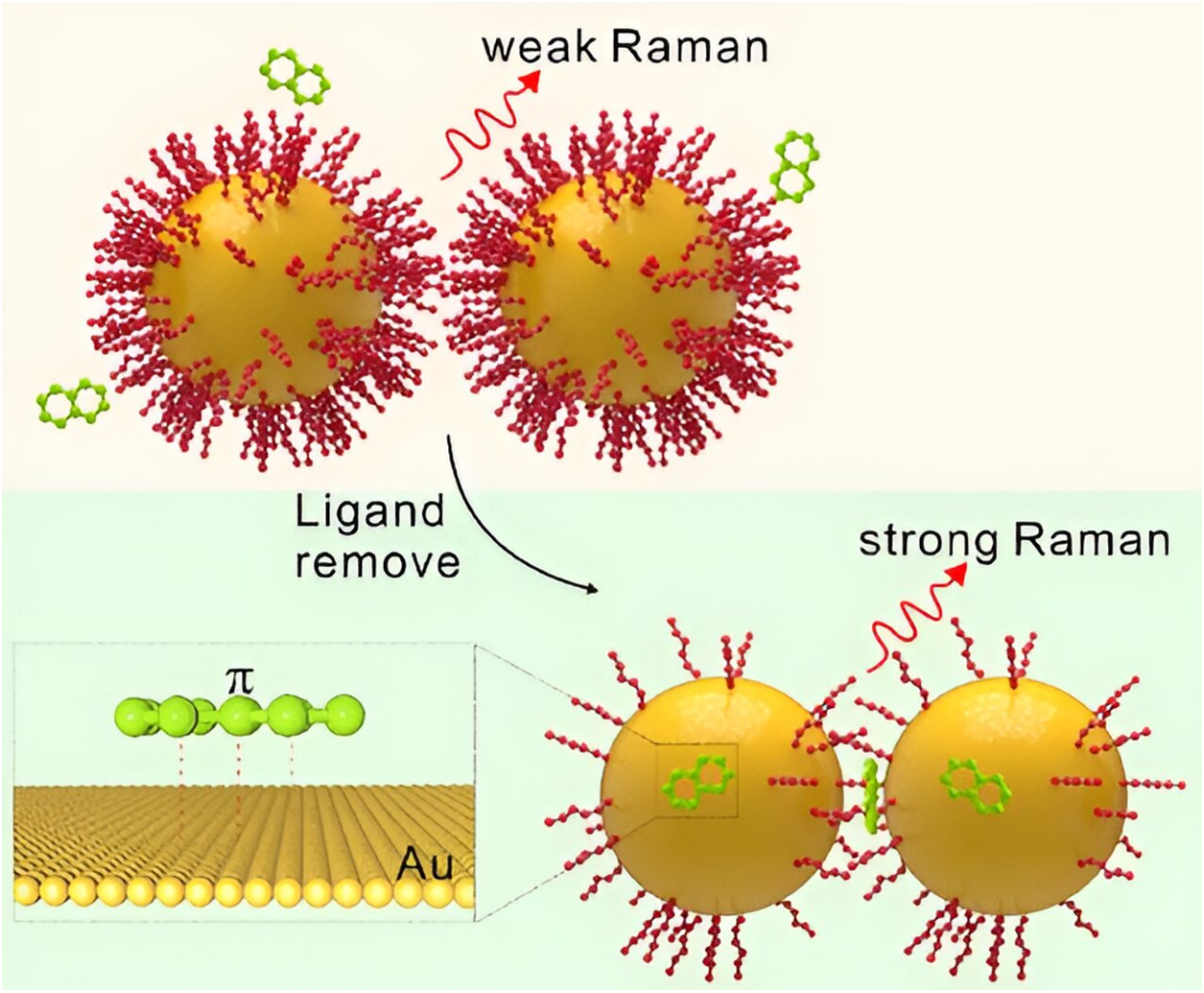

Graphical Abstract. Credit: *Analytical Chemistry* (2023). DOI: 10.1021/acs.analchem.3c03600

A research team led by Prof. Yang Liangbao from Hefei Institutes of Physical Science, Chinese Academy of Sciences (CAS), has observed the interactions between aromatic molecules and Au surfaces on a single Au nanodimer by Surface-enhanced Raman Spectroscopy (SERS).

The study is published in *Analytical Chemistry* and was selected as the front cover of the issue.

Interface interaction between aromatic molecules and noble metals is prominent in fundamental science and technological applications. However, due to the limitation of characterization technology and the complexity of experimental conditions, there is still a lack of quantitative understanding of the specific mechanism of this interaction under environmental conditions.

To solve this problem, the research team constructed an Au nanodimer structure with a subnanometer gap. Based on this structure, scientists obtained surface molecular vibration spectrum information with the help of SERS.

They also achieved highly sensitive SERS detection of polycyclic aromatic hydrocarbons (PAHs) using the same structure. They found that the SERS sensitivity of PAHs increases as the number of aromatic rings in the molecule increases. This provides a new idea for the highly sensitive detection of aromatic molecules.

At the same time, the physical adsorption types of aromatic molecules on the Au surface and the electron density distribution at the interface were also revealed.

This research shows the strong potential of SERS in the study of interfacial interaction at the single molecular level and also provides new implications for basic research and technical applications in related

fields.

More information: Guoliang Zhou et al, Observing π–Au Interaction between Aromatic Molecules and Single Au Nanodimers with a Subnanometer Gap by SERS, *Analytical Chemistry* (2023). DOI: 10.1021/acs.analchem.3c03600

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