

I. Title of data repository:

Reverse-Engineering of Graphene on Metal Surfaces: A Case Study of Embedded Ruthenium

II. Explanation of data in the repository:

This data repository contains raw data obtained from scanning tunneling microscopy (STM), x-ray photoelectron spectroscopy (XPS), and x-ray absorption spectroscopy (XAS). Most of the data files are named according to figure numbers and parts in the published manuscript, also titled “Reverse-Engineering of Graphene on Metal Surfaces: A Case Study of Embedded Ruthenium”. However, some STM data files contain file names such as “m1_ori.par”, “m1_ori.tb0”, or “m1_ori.tf0”. These file names came from the program used for STM image acquisition. These files are *not* renamed according to the figures because several measurements were taken from each STM image, therefore no singular identification can be assigned to a file to make it specific and descriptive enough.

III. How to read STM image files:

To read STM images users are suggested to use an open-access program, WSxM. In order to open an STM image in the program, for example, image 1, which is indicated by “m1” in the beginning of each *un*-renamed file name, files containing three extensions must be present, for instance, “m1_ori.par”, “m1_ori.tb0”, and “m1_ori.tf0”. Definition of each extension is listed below.

- **.par**: A **parameter** file containing all parameters used to acquire the image
- **.tb0**: A **backward-scan** image
- **.tf0**: A **forward-scan** image

IV. How to read XPS and XAS data files:

To read the XPS data files, users are recommended to use CasaXPS. To read XAS data files, users can use MATLAB, or simply Microsoft Excel.

End of Readme file.