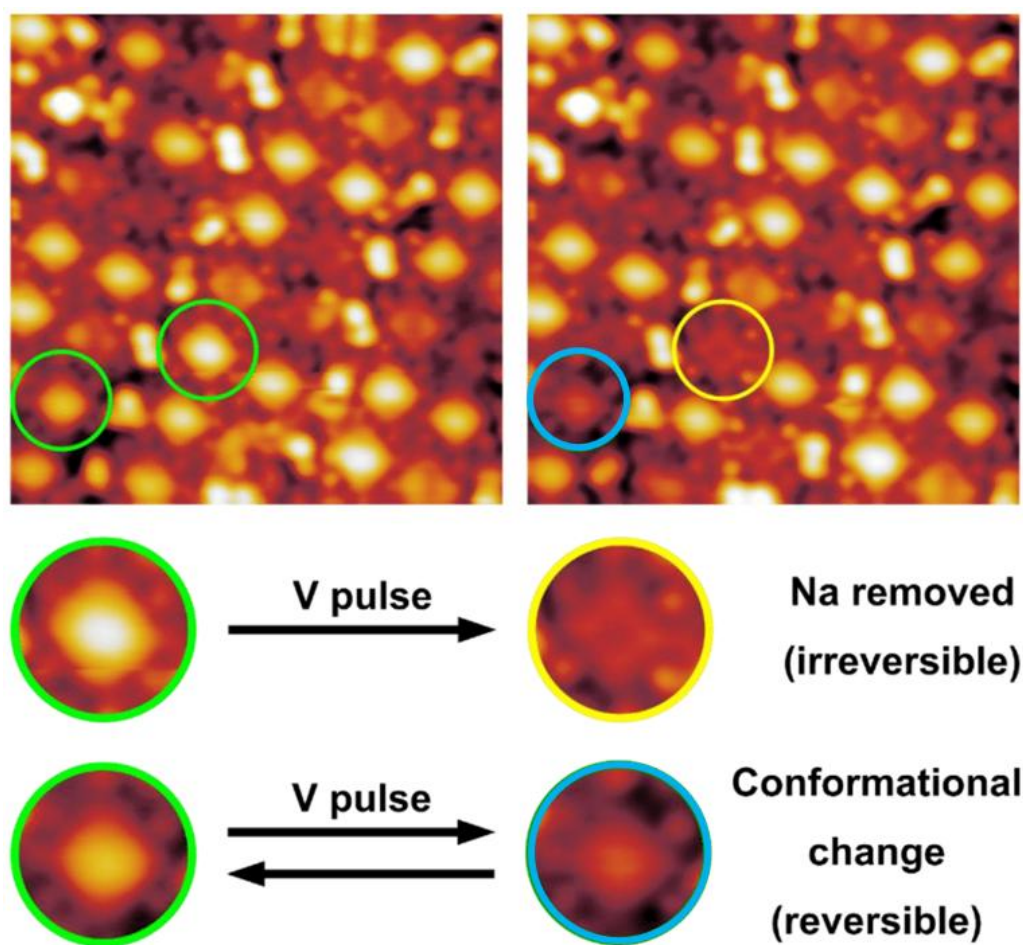


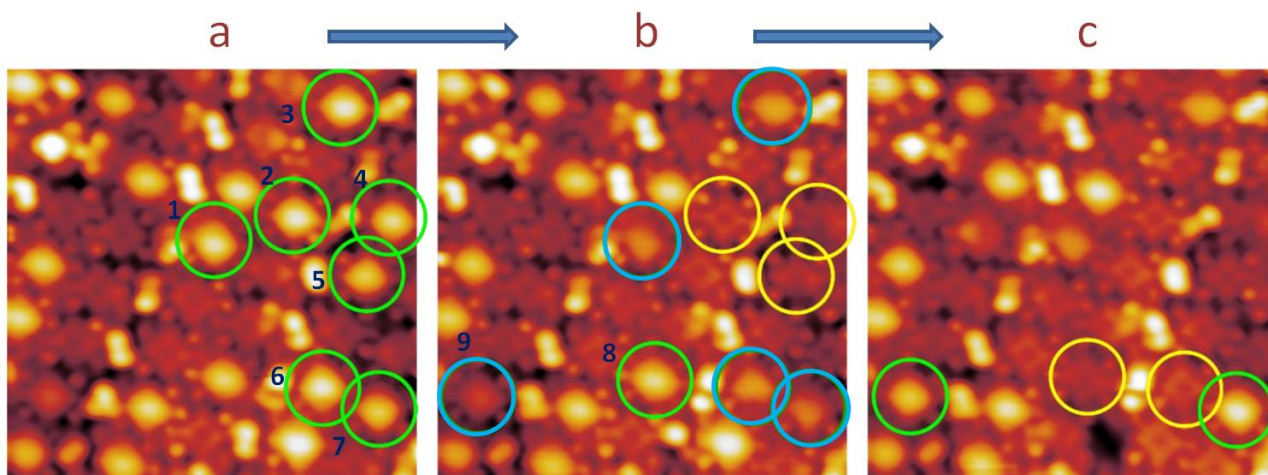
## On-surface trapping of alkali atoms by crown ethers in ultra high vacuum.

Matus Stredansky, Elia Turco, Zhijing Feng, Roberto Costantini, Giovanni Comelli, Alberto Verdini, Luca Floreano, Alberto Morgante, Carlo Dri, Albano Cossaro.

### Electronic Supporting Information



**Figure E1.** Two sequential STM images showing a STM bias voltage manipulation experiments on a Na-trapping crown-CTPP sample. STM tip was positioned in the centre of the imaged region in imaging conditions, then the feedback loop was open (i.e. sample tip distance kept fixed) and the bias voltage increased to  $V = +1.7$  V, until a variation of the tunnelling current from 0.3 nA to 4-5 nA was recorded, due to some induced change in the molecules. As a result of this manipulation procedure, the appearance of the doped CTPP either converts irreversibly to that of the undoped molecules (right panel, yellow circled molecule) or turns into a new, differently illuminated state (light blue circled). The reversibility of the latter process is shown in Figure E2. These experiments suggest that Na from doped CTPP can be either removed (irreversibly) or switched likely in a different position (reversibly) by means of a voltage pulse. Moreover, no Na removing from the Na-crown complexes was observed, indicating that the Na binds the crown more strongly than CTPP. STM imaging parameters:  $V = +0.1$  V,  $I = 0.3$  nA,  $10 \times 10$  nm<sup>2</sup>.



**Figure E2.** Multiple Na switching/removing events.  $V_{\text{bias}} : 2 \text{ V}$ ; STM imaging parameters:  $V = +0.1 \text{ V}$ ,  $I = 0.3 \text{ nA}$ ,  $10 \times 10 \text{ nm}^2$ .

From panel a to panel b: CTPP 2,4,5: Na removed (green to yellow)

CTPP 1,3,6,7: different conformation (green to blue)

From panel a to panel b: CTPP 8, 6: Na removed (green to yellow)

CTPP 9,7 : different conformation (reversed, blue to green)