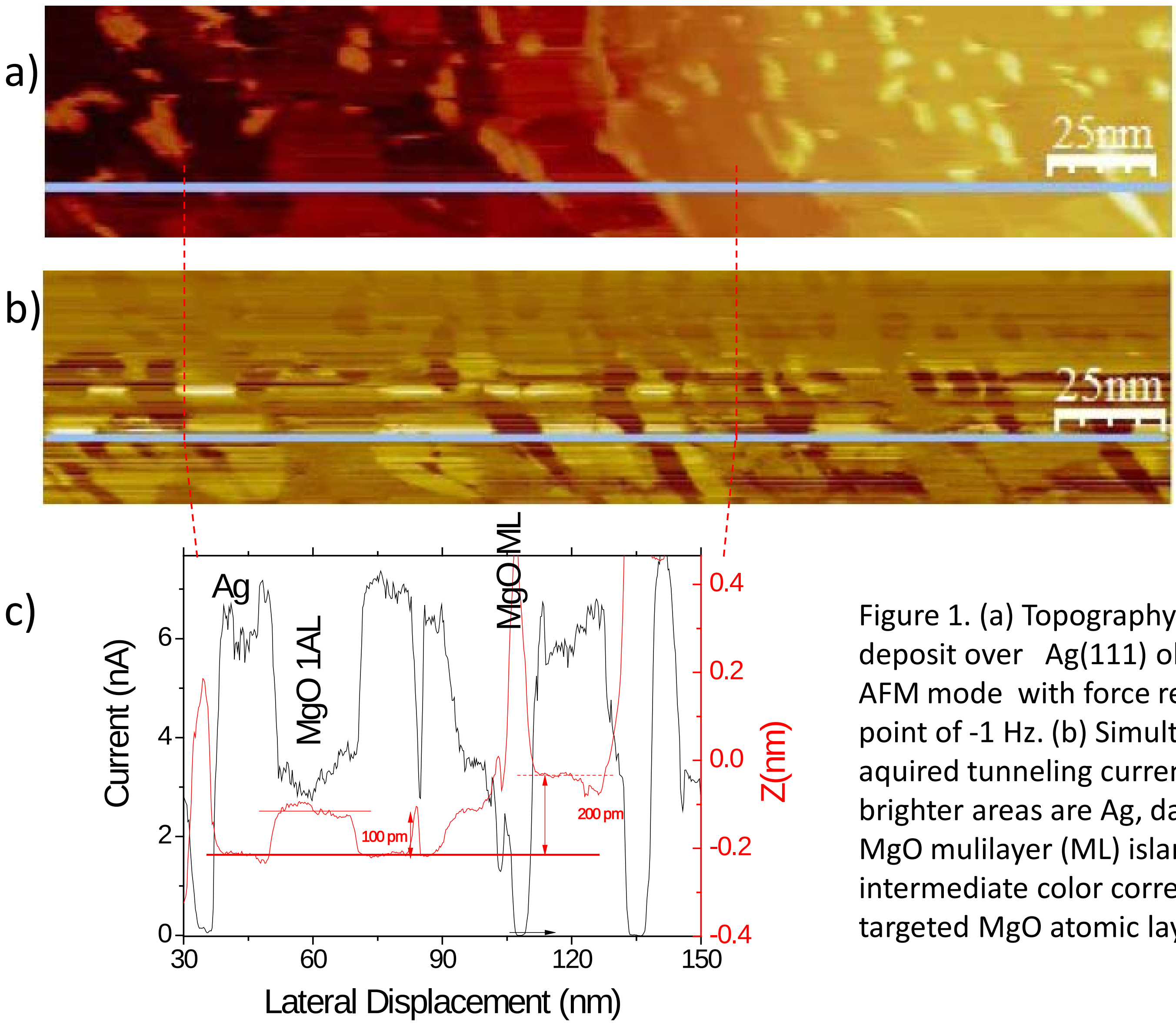

Figure 1. (a) Topography image of MgO deposit over Ag(111) obtained in nc-AFM mode with force regulation set point of -1 Hz. (b) Simultaneously aquired tunneling current at bias 5 mV: brighter areas are Ag, darker areas thick MgO mulilayer (ML) islands and intermediate color correspond to the targeted MgO atomic layer (AL).

SEVENTH FRAMEWORK PROGRAMME

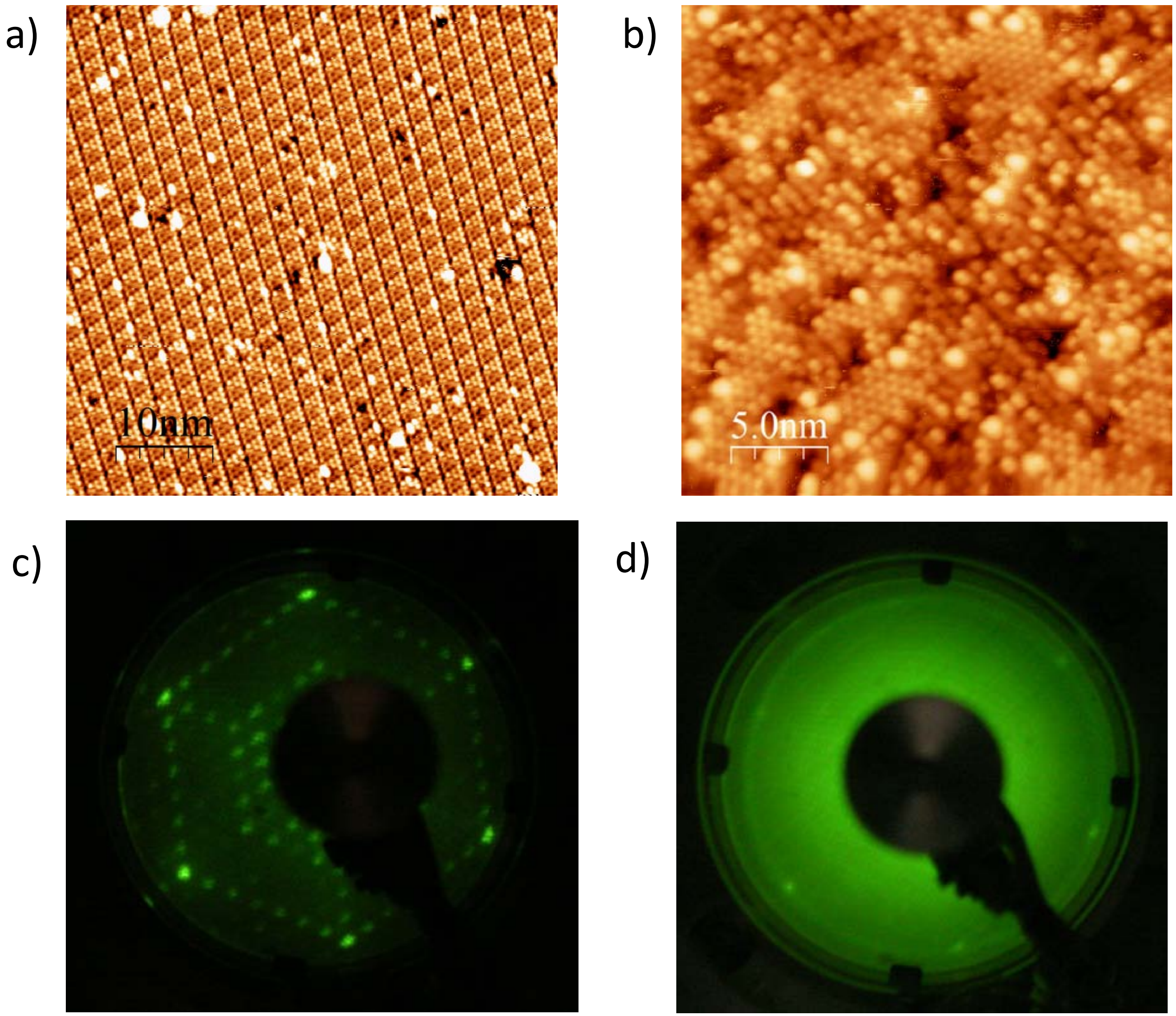

Figure 2. (a) STM of Si(111) surface showing the 7x7 reconstruction prepared by annealing and flash cycles at 850 ºC and 1250 ºC respectively. (b) After a clean Si surface is obtained, Bi is evaporated by MBE and the first monolyaer grows epitaxially in a √3x√3 reconstruction. c) Low Energy Electron Diffraction (LEED) pattern of the reconstructed Si surface. The Si lattice appears as brighter spots, the darker spots correspond to the 7x7 superstructure. d) LEED pattern of a 10 ML thick Bi film where the Si pattern is barely visible and the Bi lattice parameter is given by the ring radius.

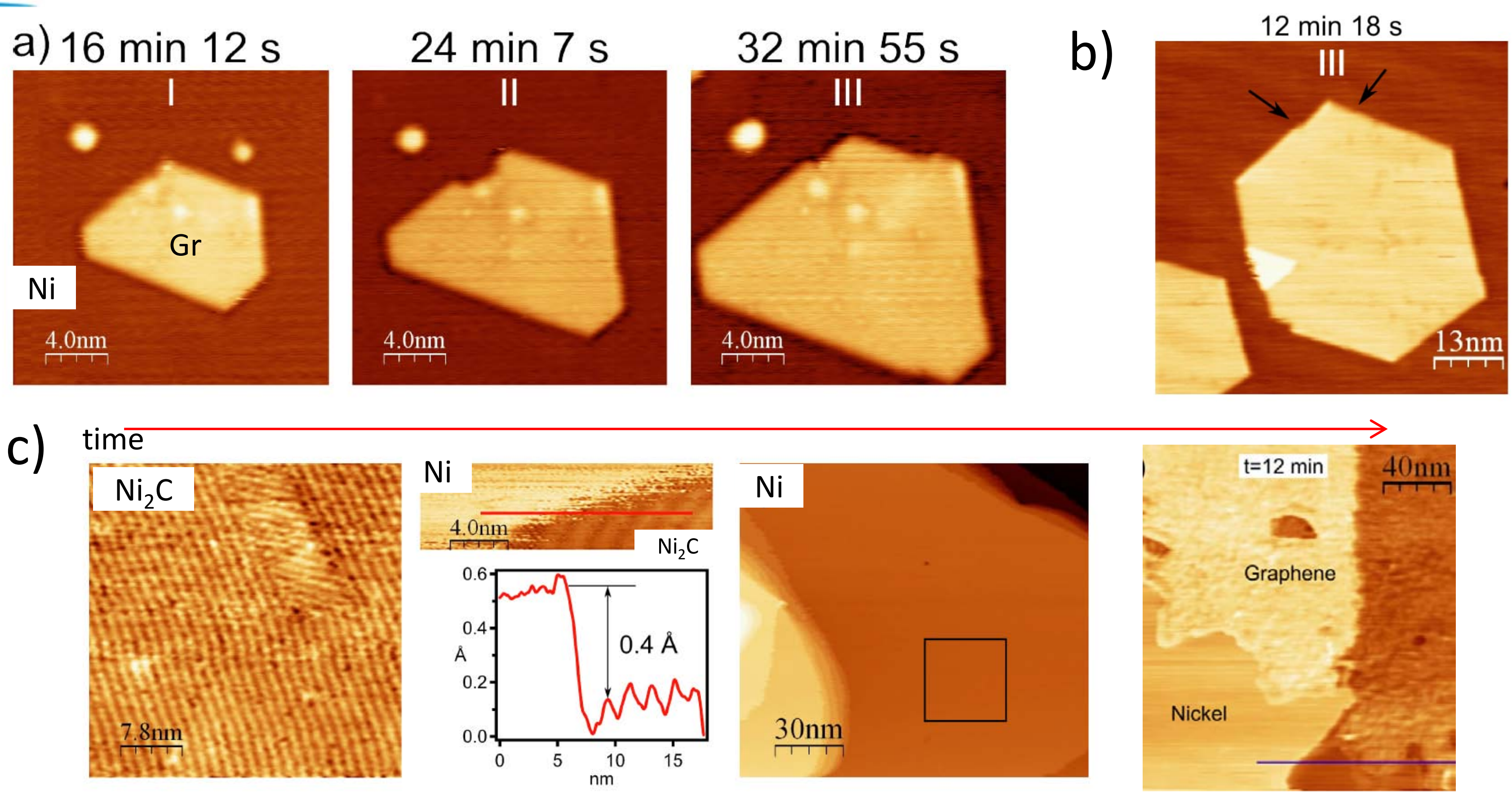

Figure 3. (a) STM monitoring of the growth of Graphene islands on Ni(111) at 500 ºC, the triangular shape indicates that zigzag edges are energetically favored at this temperature. (b) Final stage at 650 ºC, in this case, the hexagonal shape indicates equally probable zigzag and armchair edges (which stand for different stacking with respect to the underlying Ni crystalline structure). (c) STM monitoring of the growth of graphene monolayer at 500 ºC, this time in the presence of 10^{-6} mbar of propene. From left to right: Ni_2C phase is stable as long as the propene gas floods the chamber, when the propene dosing the chamber recovers UHV conditions and C diffuses into the bulk very fast, a complete Ni surface is recovered and finally, after 12 minutes keeping temperature constant the diluted carbon gets back in the form of graphene as a growing front which eventually covers the whole surface,

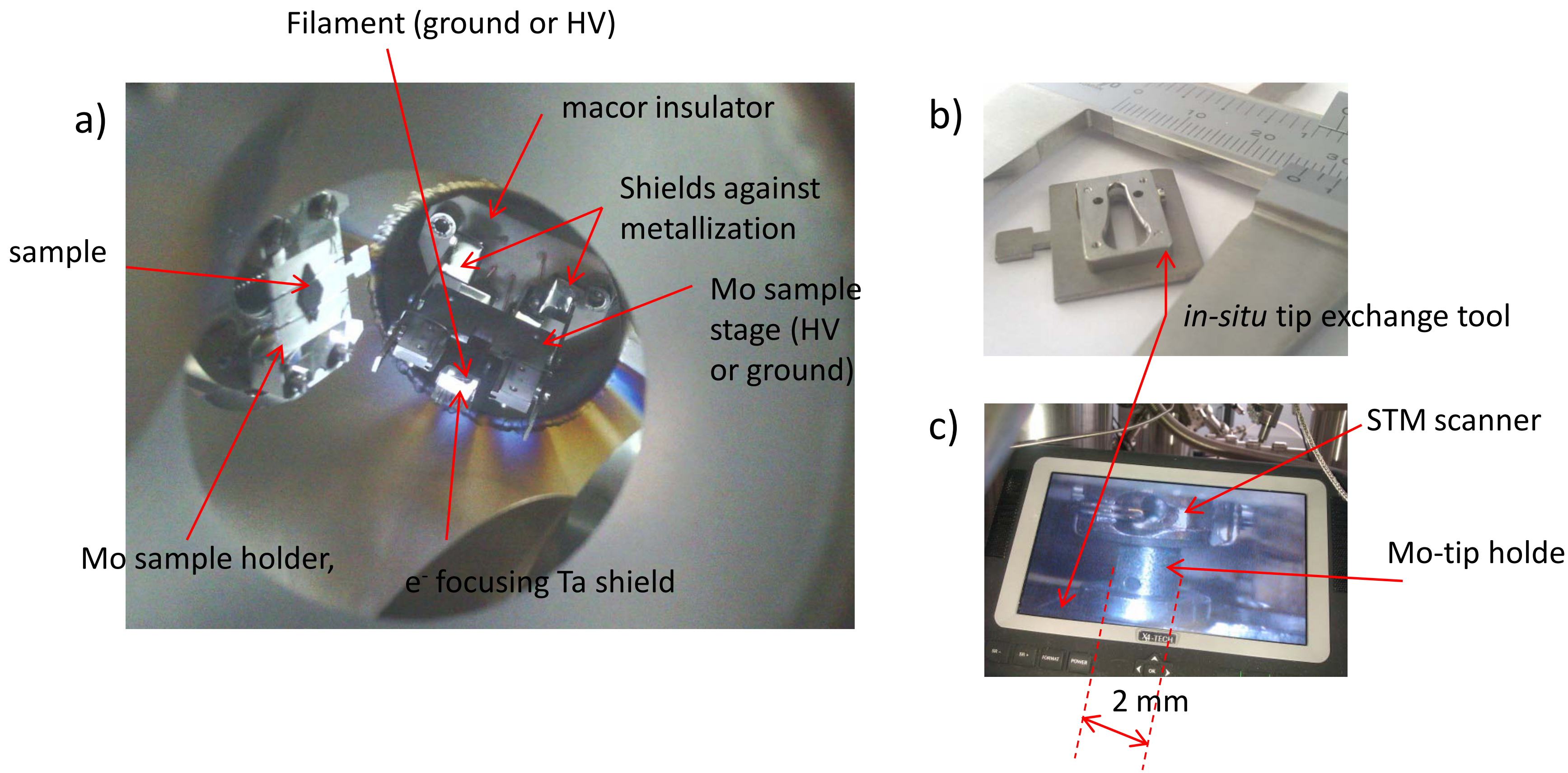

Figure 4. (a) All Mo-based high power heater. The range of 200 to 300 W allows temperatures both in the tip and in the sample above 2400 K. Up to 600 W can be safely applied in the case that samples with larger volume are used. (b) Mo tip shuttle designed to flash the tip apex at 2300 K and for *in-situ* tip exchange at the cryogenic STM head. (c) Camera image during the insertion of the Mo tip holder into the STM scanner.

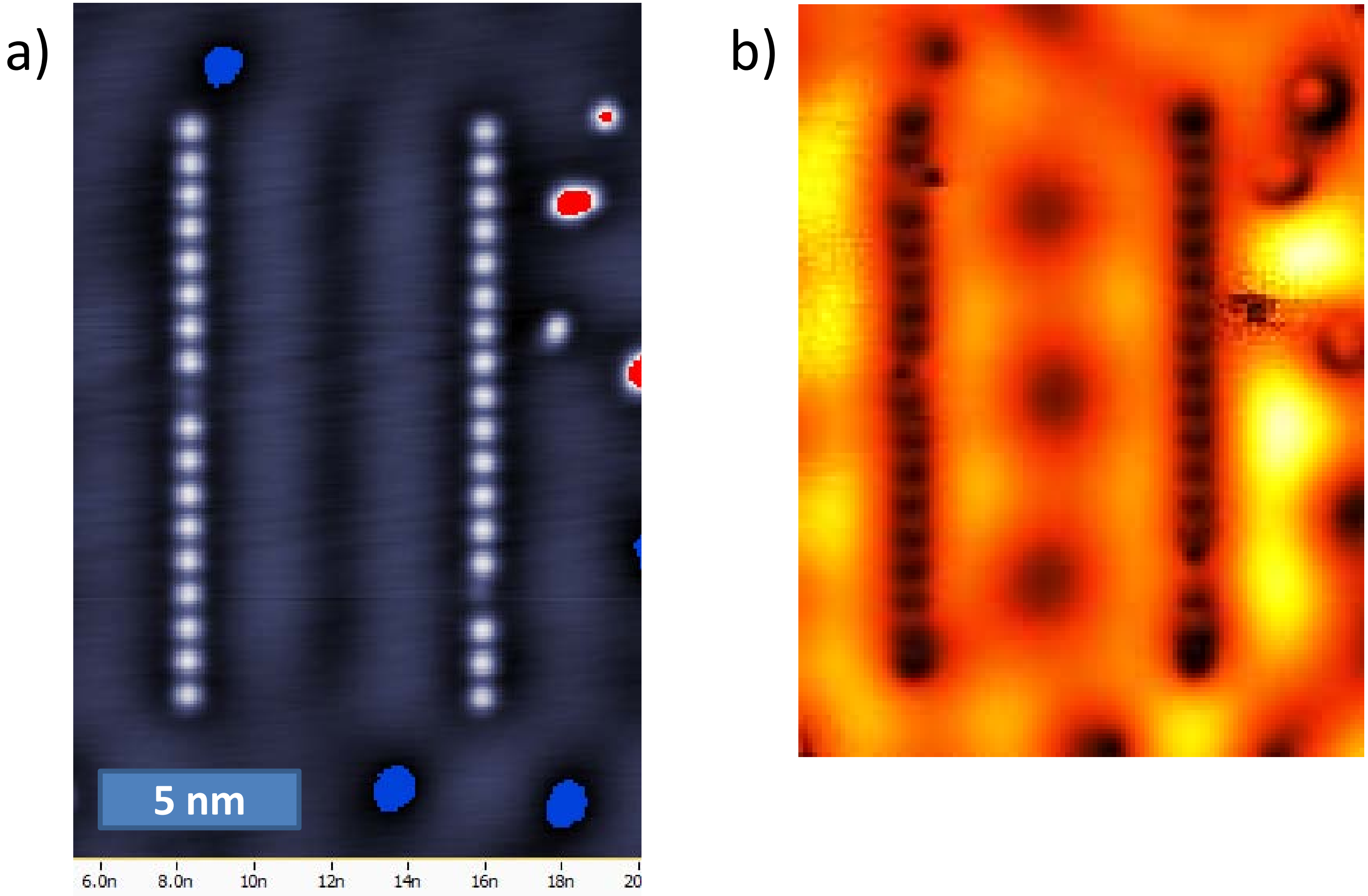

Figure 5. (a) STM (Temperature 1.2 K) topography after the construction of a lineal resonator made of 40 Co atoms on Ag(111). (b) Simultaneously aquired dI/dV map at Fermi level (zero bias) showing the local density of states (LDOS) quaiparticle interference arising from quantum confinement of the surface electrons. The controlled modulation of the LDOS is useful to tailor the magnetic properties of atoms and molecules positioned inside the resonator.