RAMAN SPECTROSCOPY

Tipping point

Guillaume Goubert and Richard P. Van Duyne

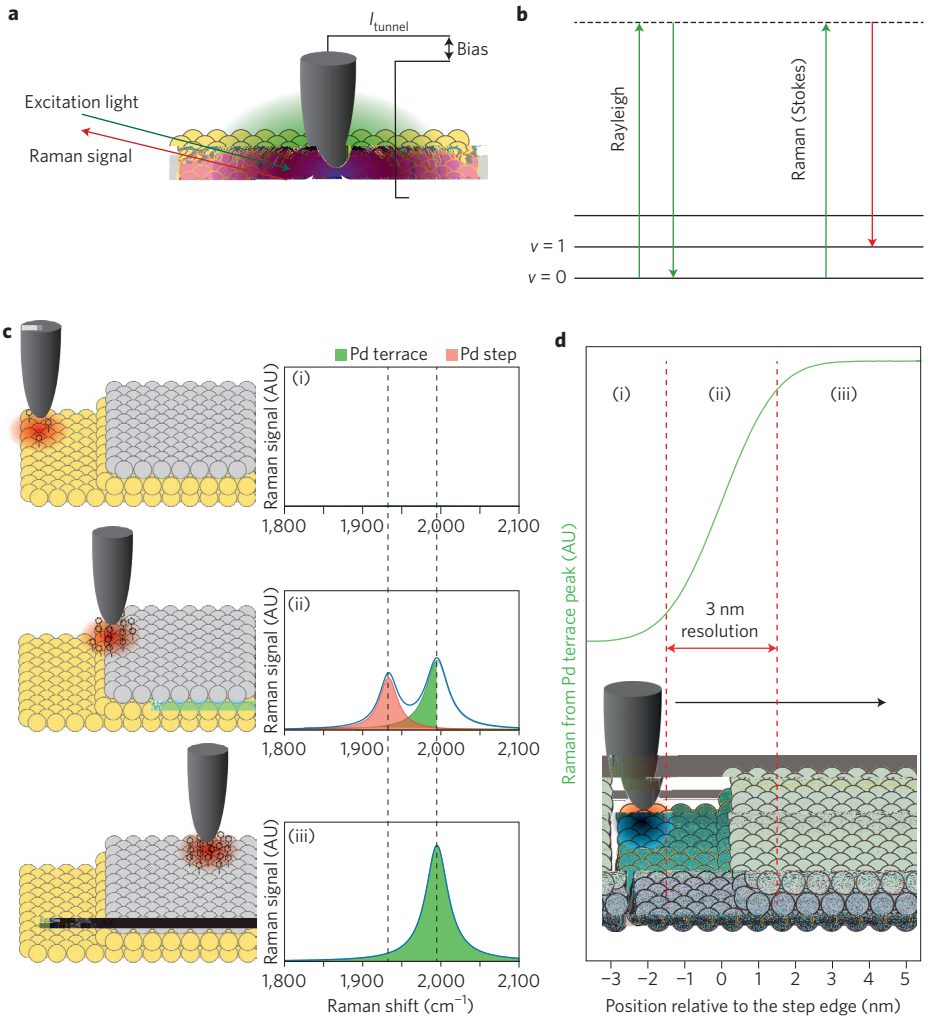

Figure 1 | A **a** **b** **c** **d**

A anc in n ca a i m n a in n ca a . i i abi c a ac i a in i b n a an c mica ac i a in i . M a m n b i n x ac m c a c an a in m a am im . T an mi i n c n mic c an cannin b mic c i i a ia in; b a n c mica in ma i n c n n . On an , ib a ina c c i ai in ma i n n c an i n i a ba ; b i a imi in in b i ac i n i . W i in in *Nature Nanotechnology*, Bin R n an c - m Xiam n Uni i an Uni i S Ca ina n n a ac i in i - n anc Raman c c (TERS) in ic a m n a a ia i n 3 nm ai i c mica in ma i n c n n Raman c c [1].

TERS i a m mb a ami c ni i n c m ica i ac i n imi b in ca c ma n ic c nc n a a a i (n a -)[2]. Am n c ni , TERS a m n a i n, i c n ac in b-nan m [3] an abi i ic imina b n n i b in ac a m c [4–6]. In TERS, a a i , ma a a m nic m a (a A A) i cann a ac i b-nan m ci i n in a cannin b . m b n b an ac c n ain an in n c ma n ic ( ), ic ma Raman n n i a x in cannin (Fi . 1a,b).

R n an c - a a - n ac c n i in a bm n a c a P n a A (111) ac . i c mi in n i c ani (PIC) n A an P ac i . TER c a c a i nc b n A an P main i nc in ac c a an c mi i n i PIC n i n m a ac . a c a ac i TER c a ac P /A a mic . TERS in can a a a c a ac i ic C≡N m i PIC m c , ic i i c b n ac a m , i i b 60 cm^{-1} a P c m a i P ac (Fi . 1c). i i c n i n i DFT ca c a i n a a bac na i n m *d* ban m a an ib n in π^* bi a PIC a

i i a an a ac i .
i bac na i n a n C≡N b n
ic ma PIC m ac i n P
an n P ac .
B m im an R n an c -
a m n a a ib a i na
c c can b -
n ac a a a mic .
Un i n , TERS ma in ac i n i
(i i n n a i a 10 nm) a
b n imi i - n ac
n c ac i i a i n i c b
i 7. In in R n an c -
b an inc a TERS i na a
, ib an inc a
c nc n a i n a a m a ic a
(i nin c). i m an a TERS
can b ci ca n i i a a
n a ca a ic ac c a , in ,
i a a a m m a / xi in ac ,
ic a b ac i i in a
a i ac i n .
H , in b m a i