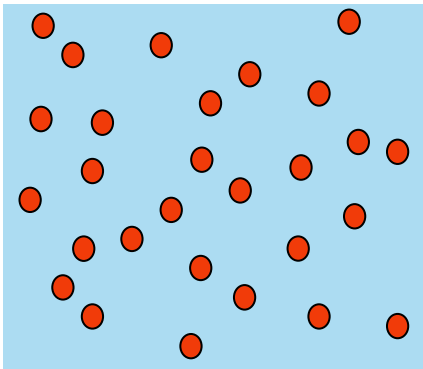
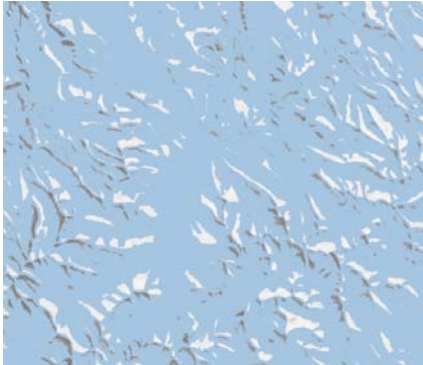


Electromagnetically exciting the Electron-Glass

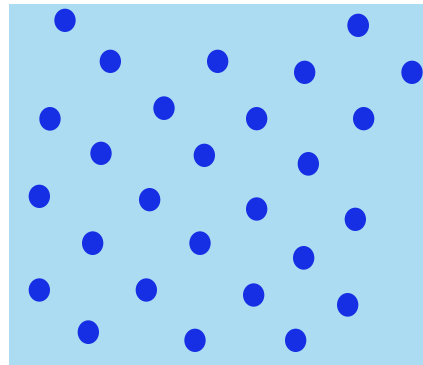
The case of infra-red radiation

...in a disordered potential

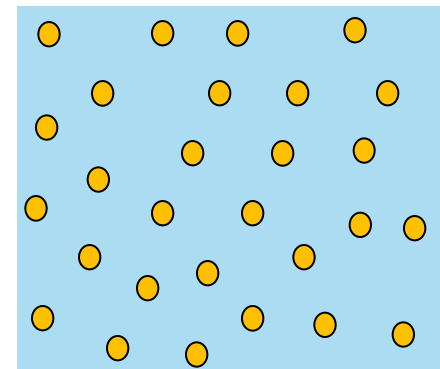
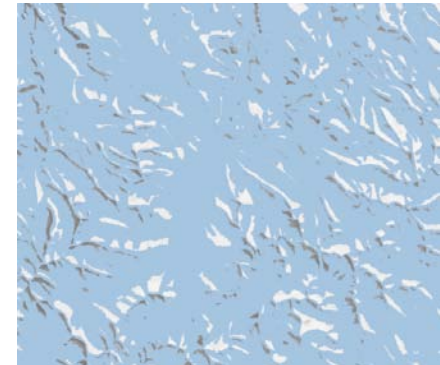


... in an ordered potential

(but with Coulomb interactions)



...both...



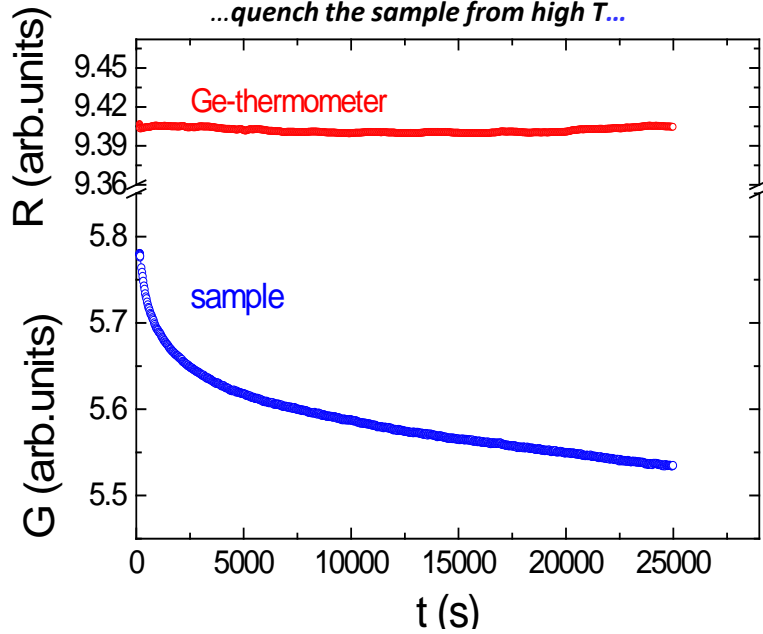
interaction



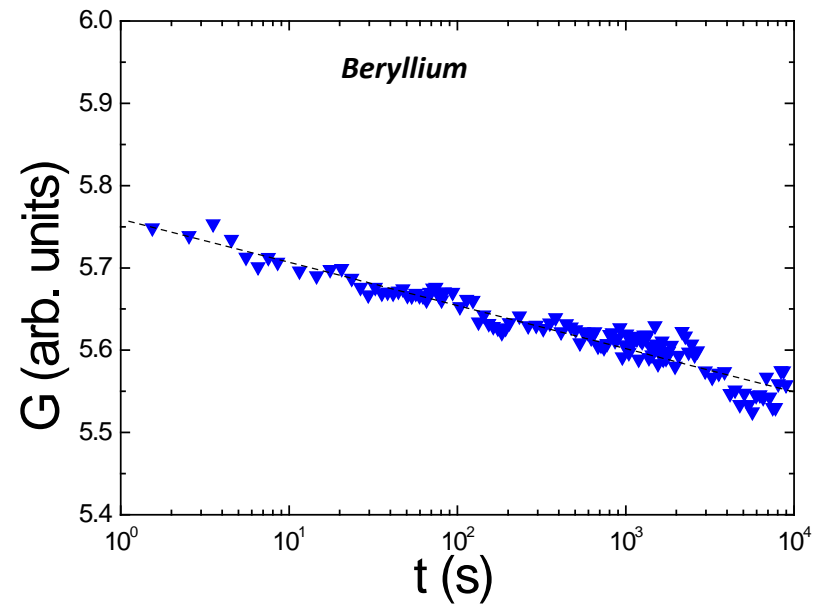
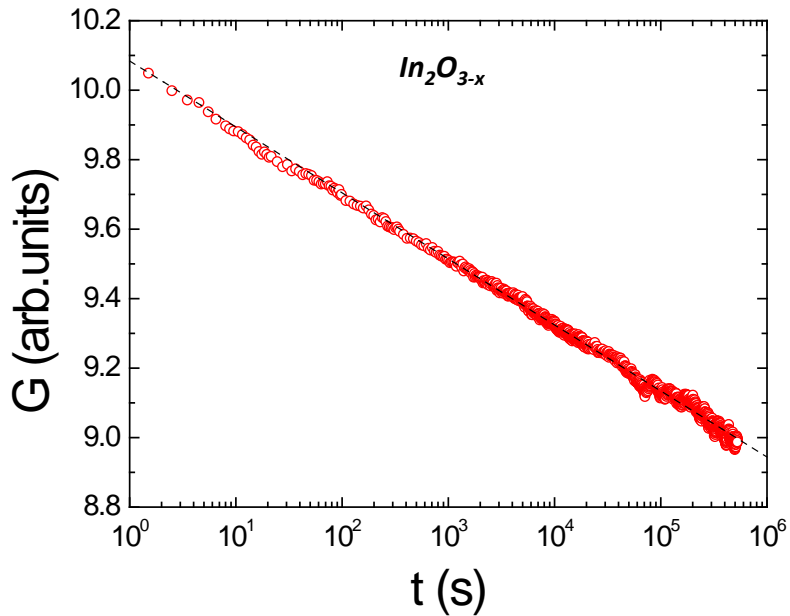
...frustration...

The basic phenomena

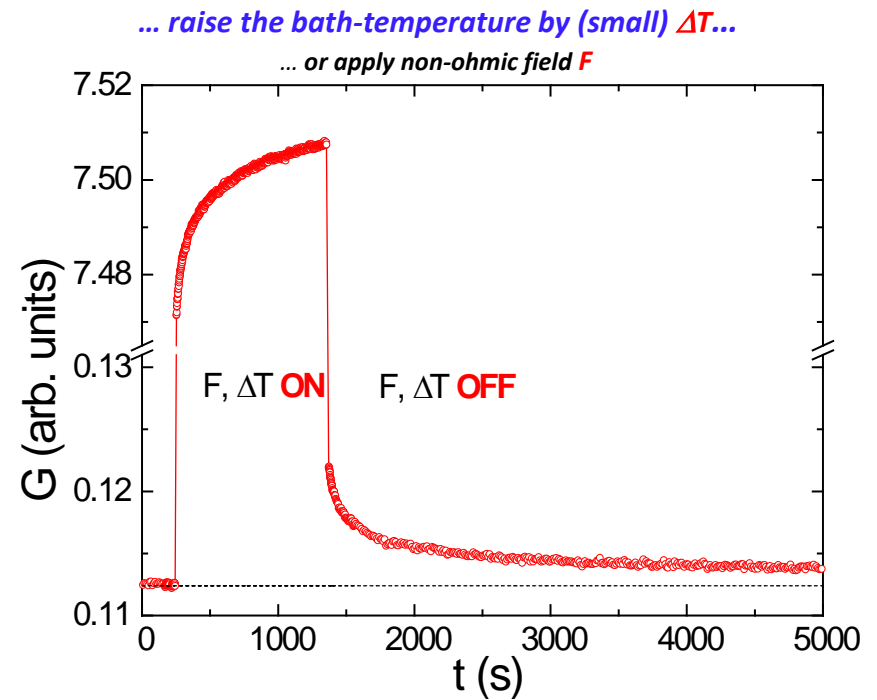
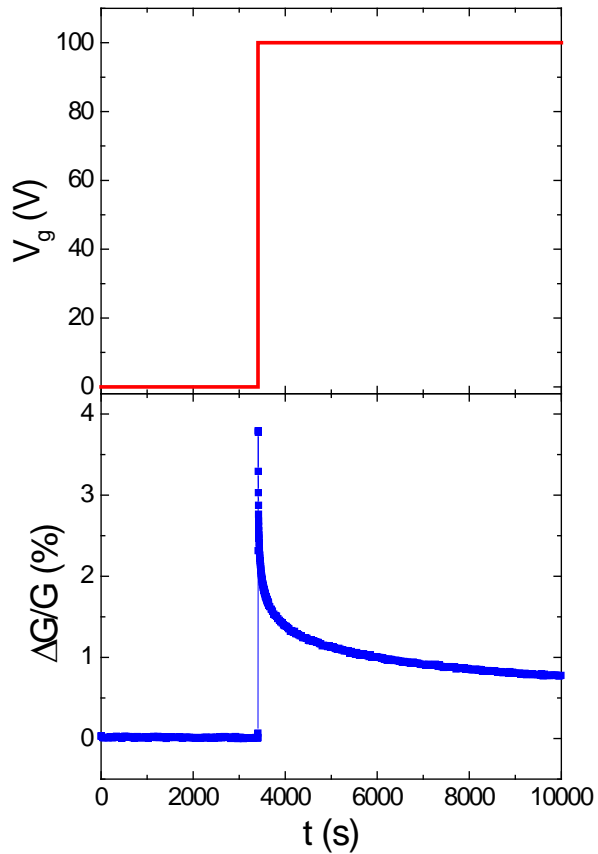
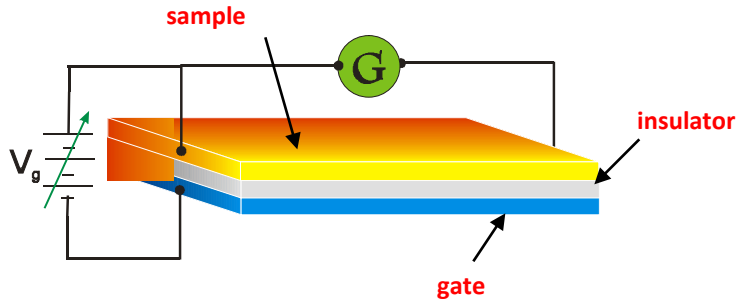
...slow relaxation...



Unless otherwise mentioned; **T=4K**, and
all samples are **2D** and in the **hopping regime**



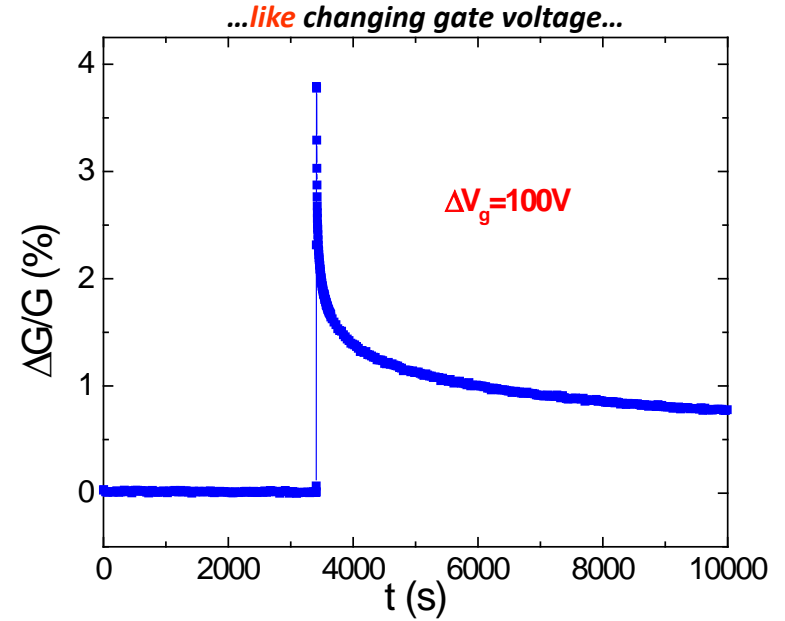
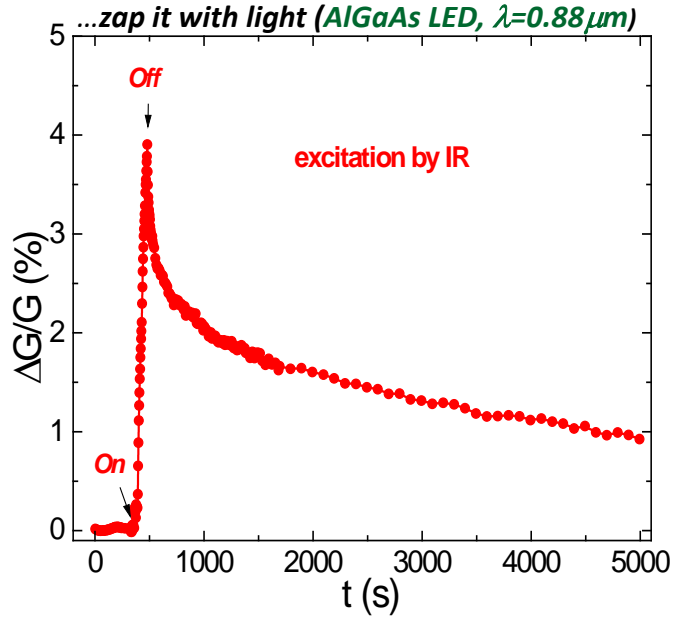
...more ways to get it out of equilibrium...



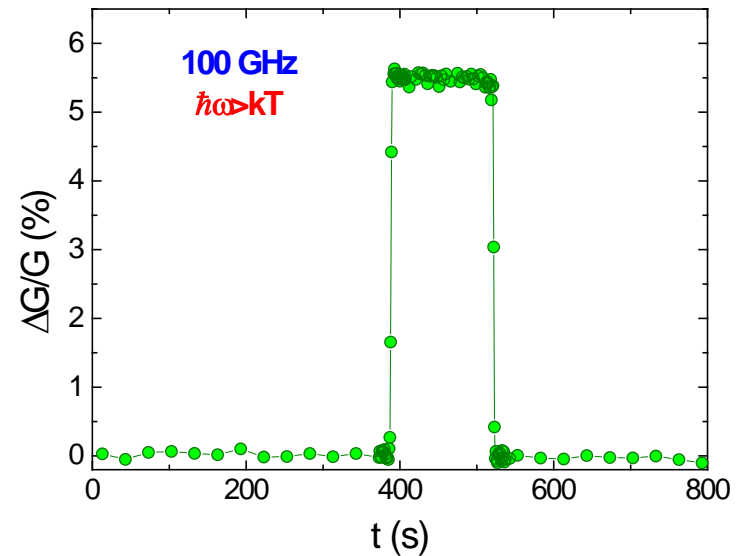
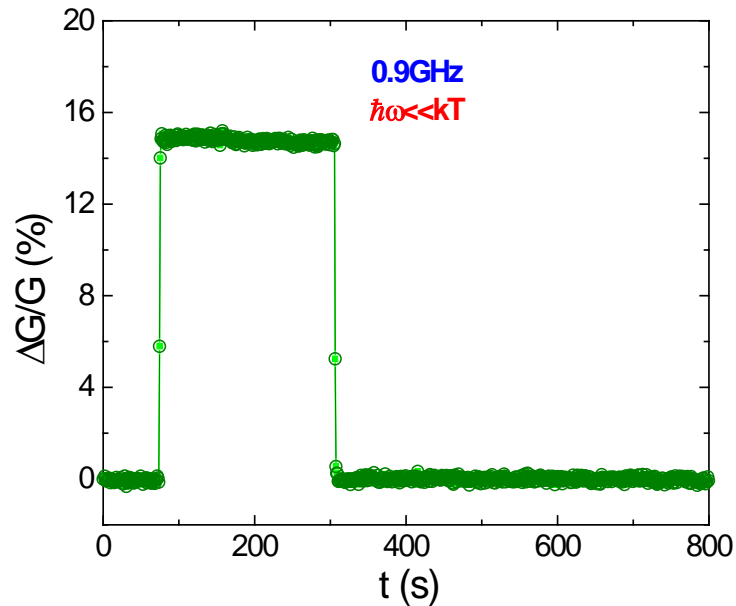
...one more way to get it out of equilibrium...

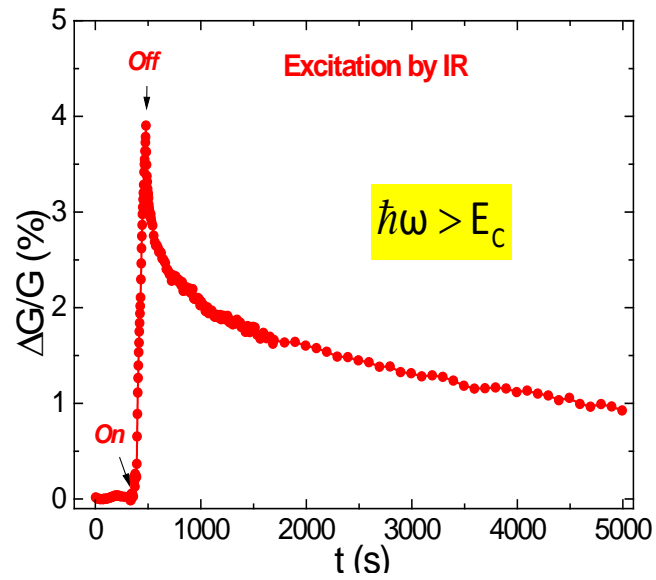
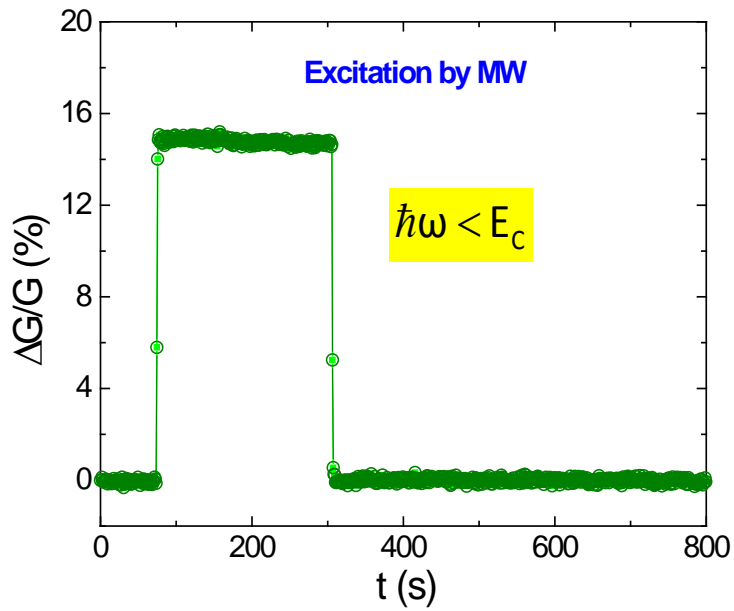
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electromagnetic radiation



...not all photons are born equal...

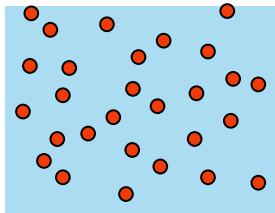




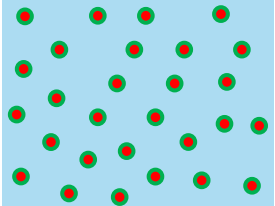
E_C is set by the
Coulomb
interaction

Out-of-equilibrium

High energy, random
distribution, conductance = **high**



higher energy, correlated
distribution, conductance = **high**

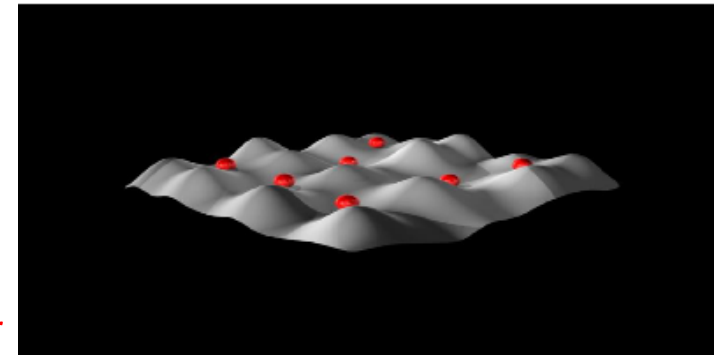
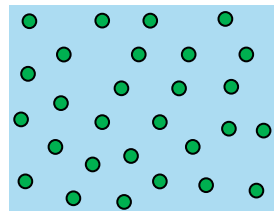


Slow relaxation

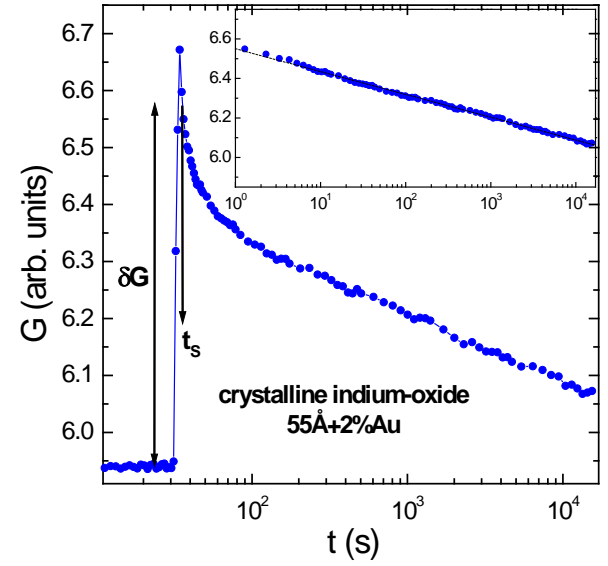
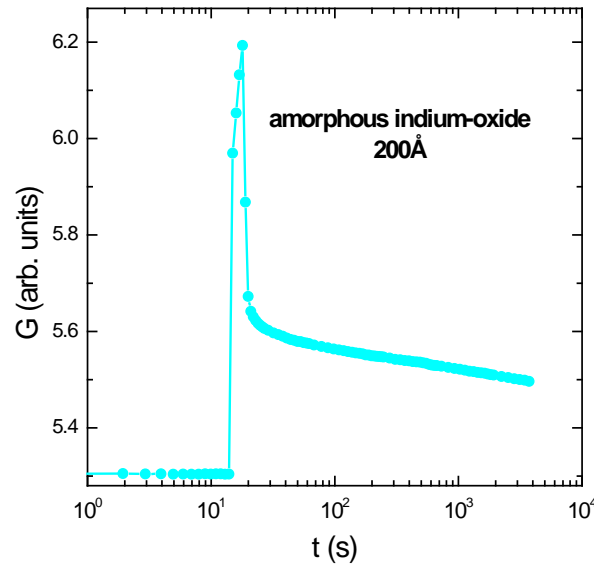
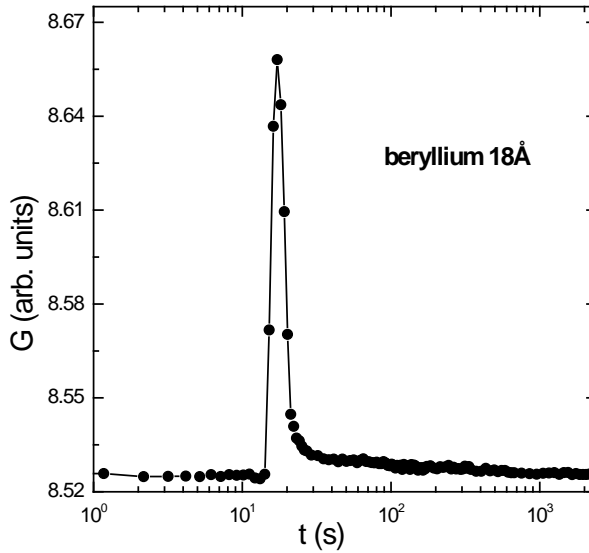
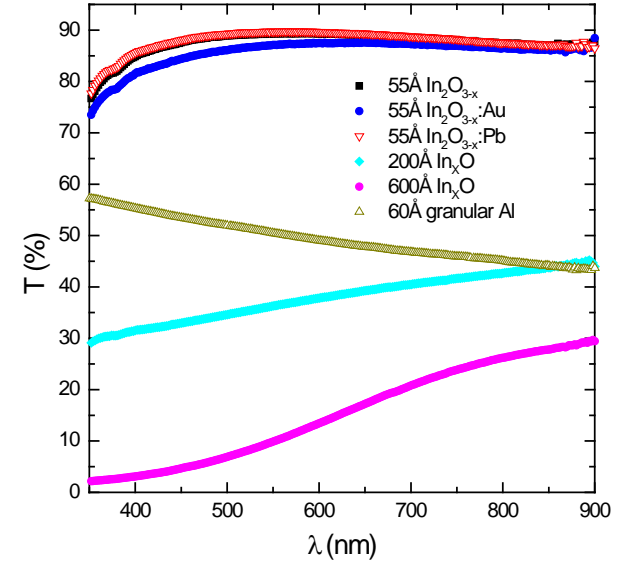
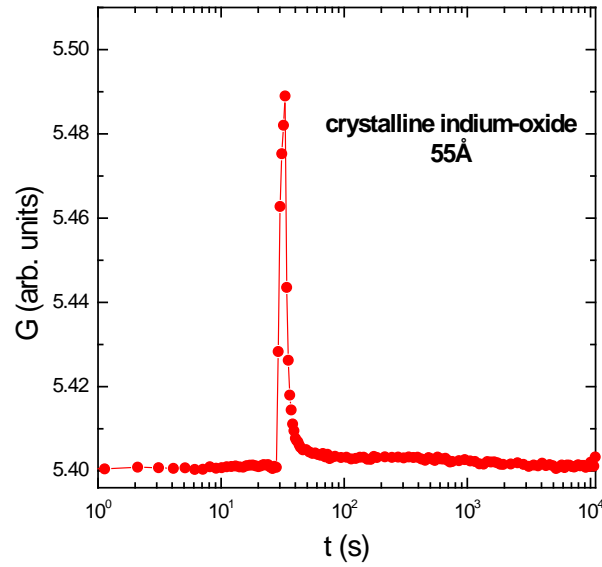
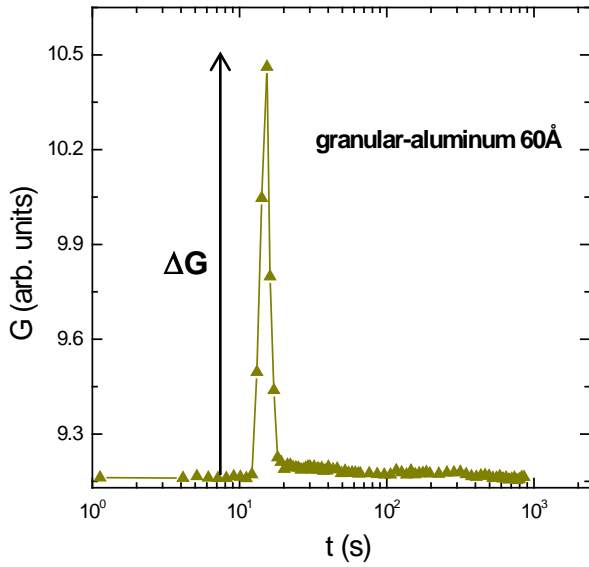
Fast relaxation

Equilibrated

Lower energy, correlated
distribution, conductance = **lower**

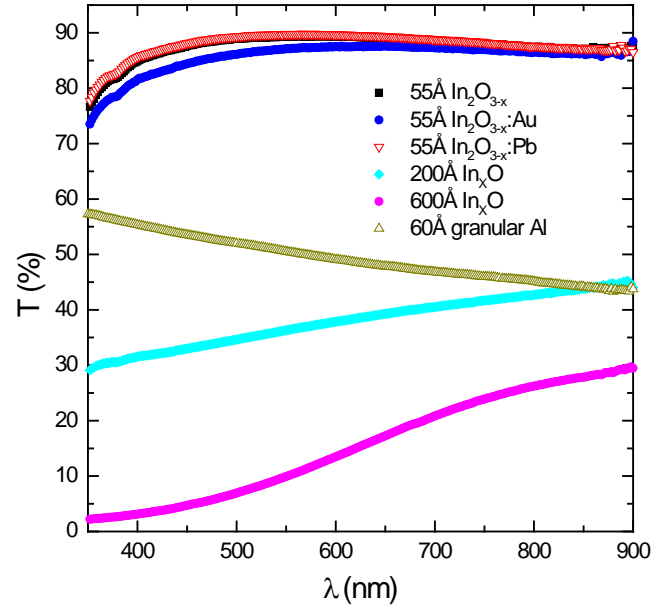
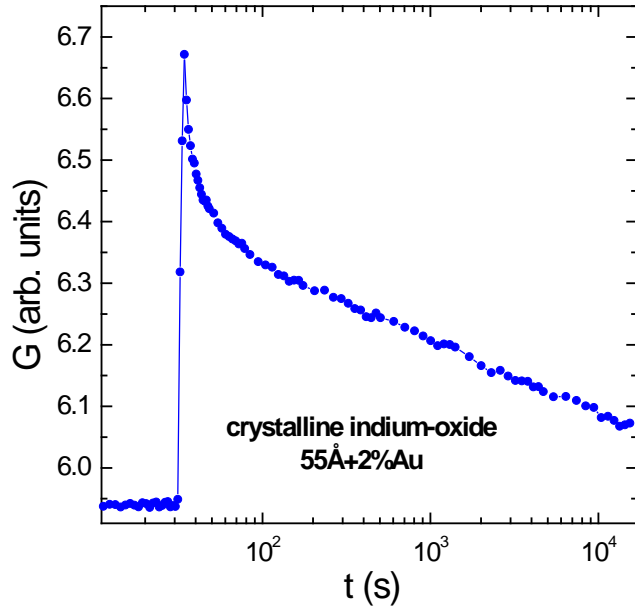


...difference between MW and ΔT ??

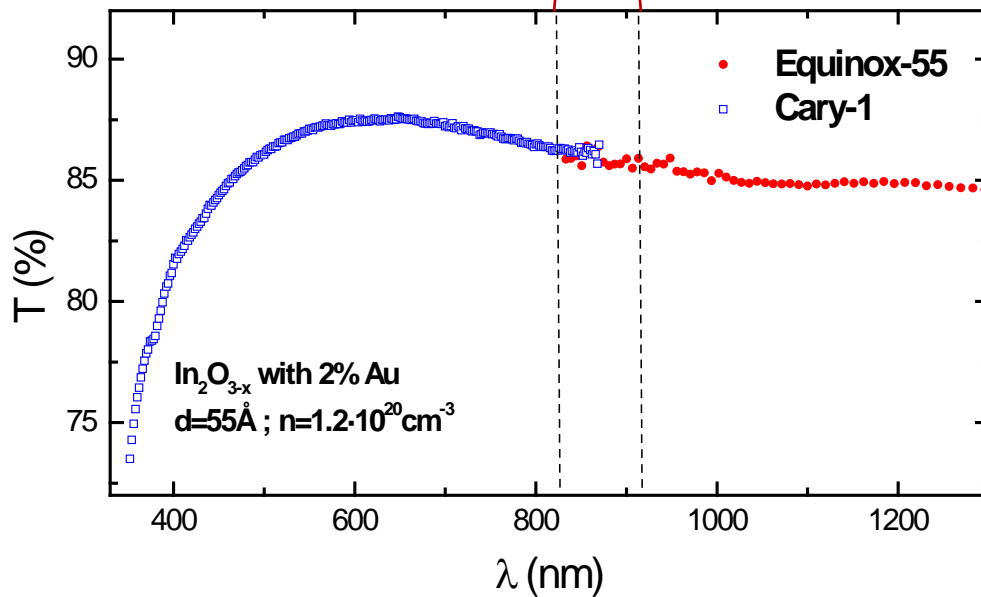


$\delta G/\Delta G$ does **not** depend on R_{\square}

...how is energy absorbed to affect randomization?

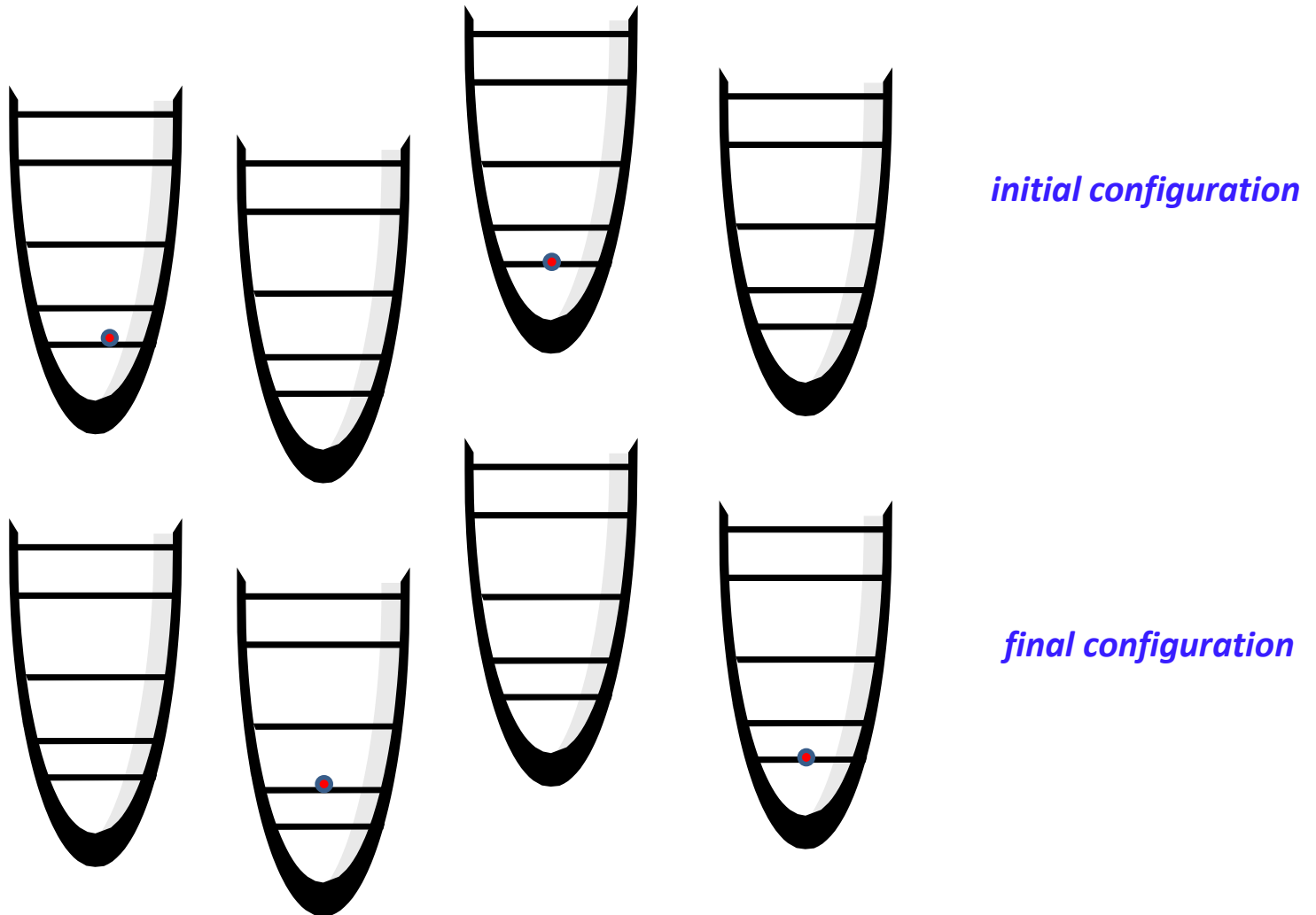


Spectrum of IR source

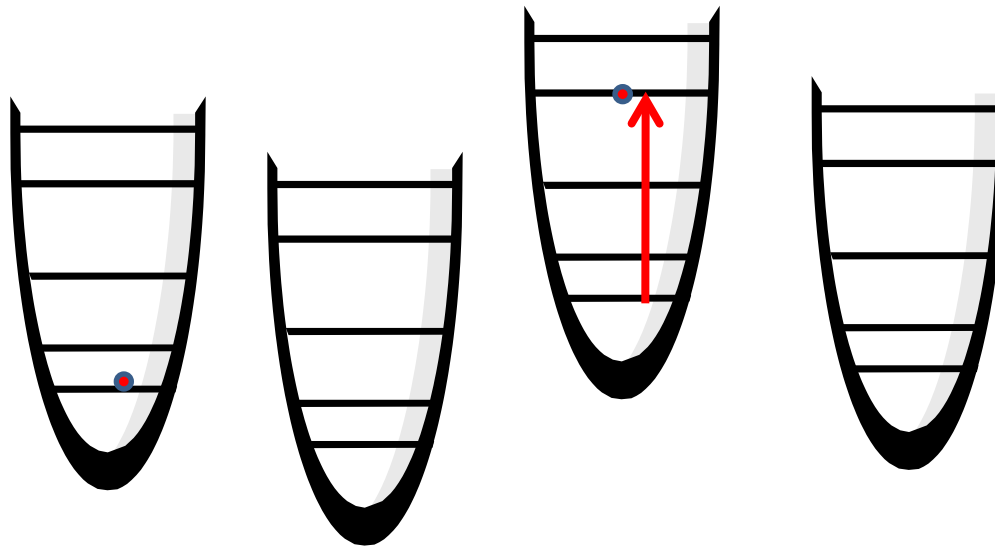


...must be *intra-band* absorption!!

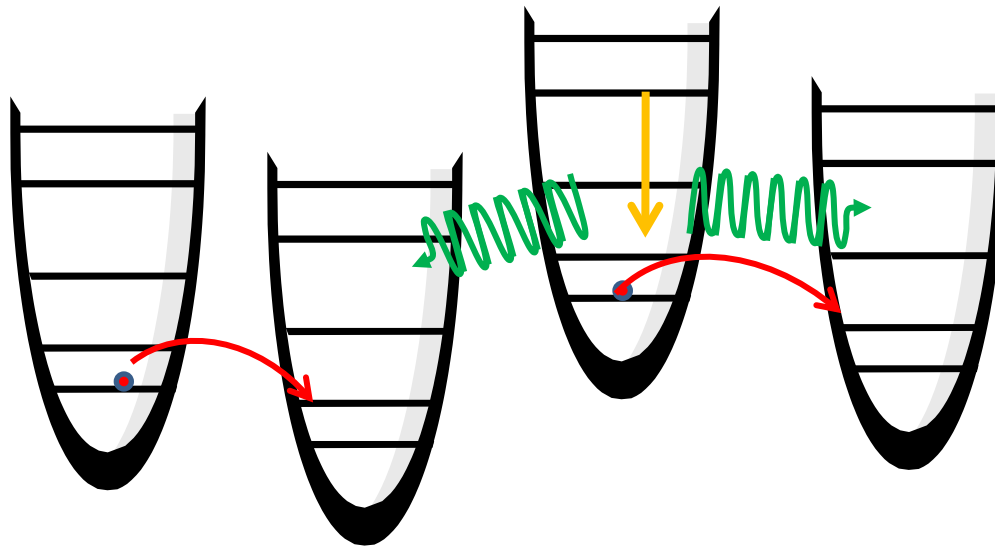
Charge re-distribution due to optical excitation



...1st stage: vertical (on-site) excitation...

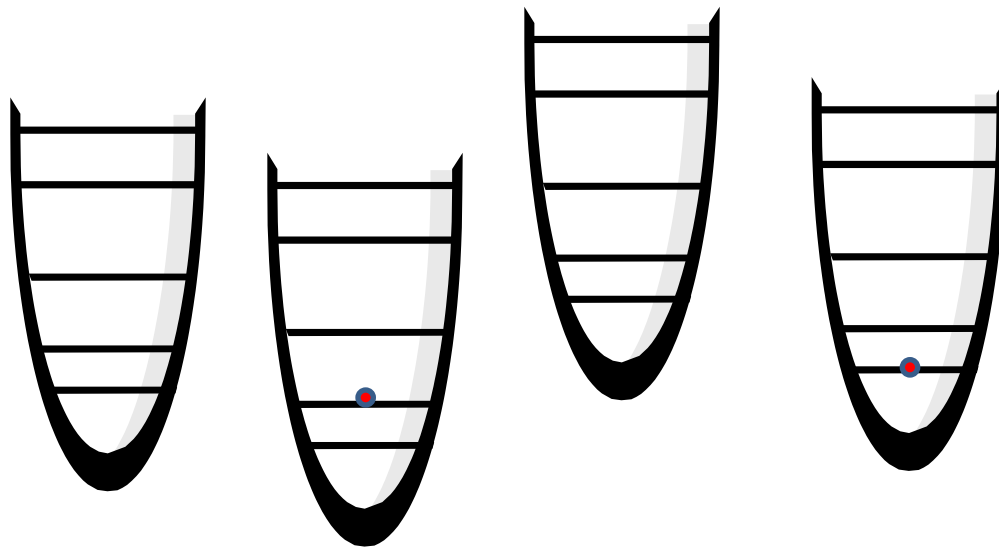


...2nd stage: on-site relaxation + phonon emission...



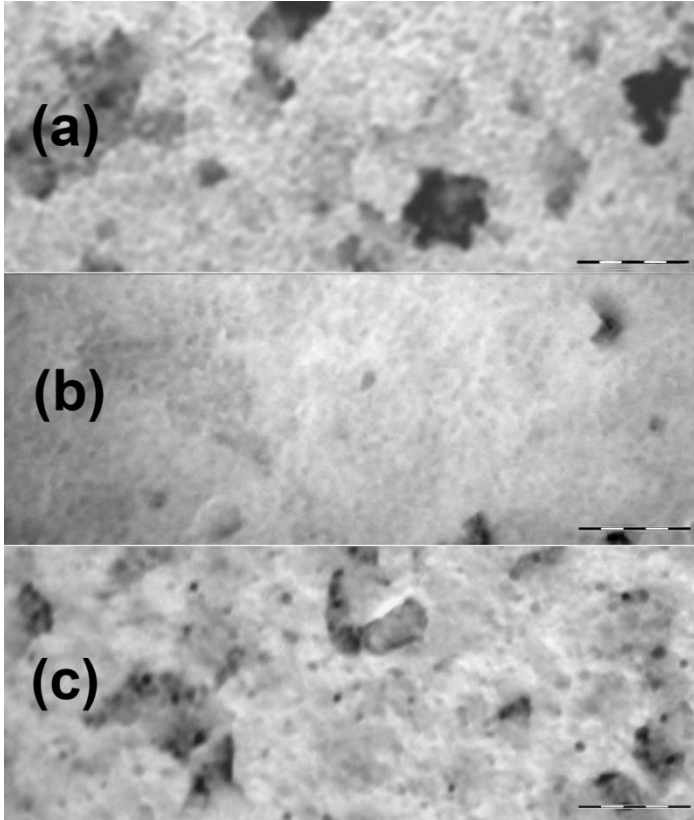
*...inducing inter-site
charge transfer leading to...*

...new (excited) configuration...

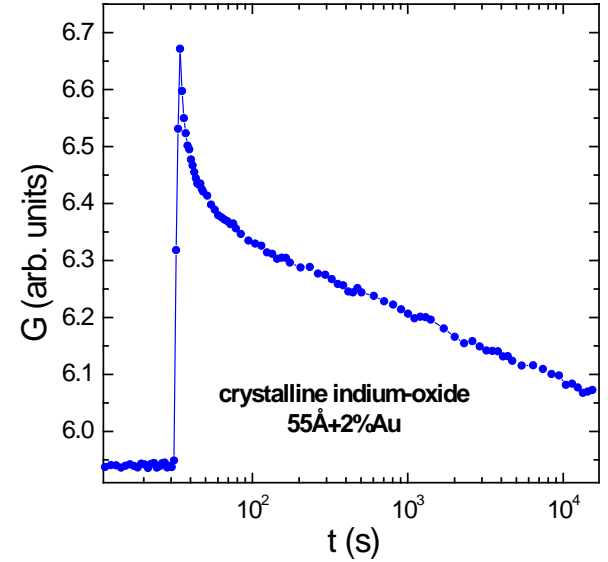


...defects are **not** the reason for the enhancement...

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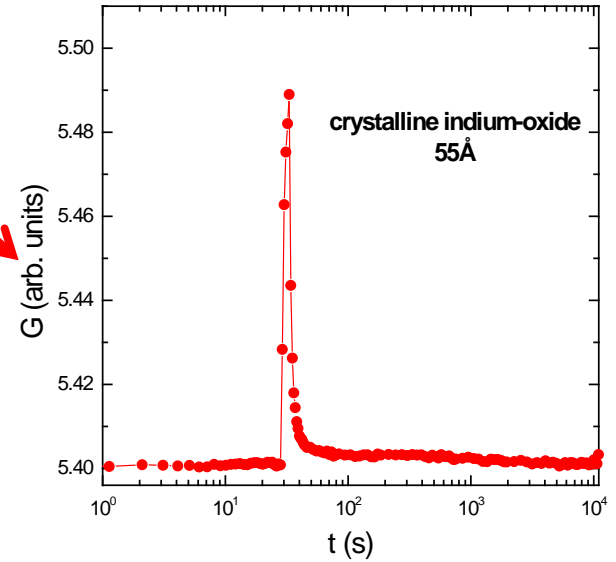
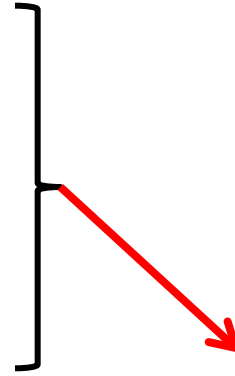


$\text{In}_2\text{O}_{3-x}$ +2%Au
Crystallized at 560K

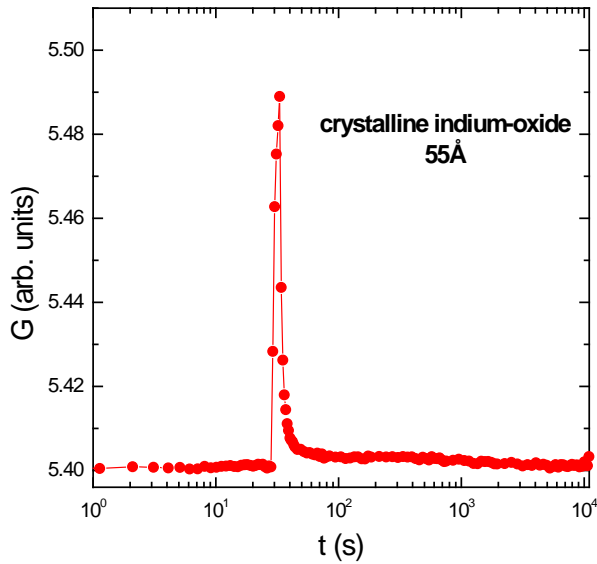
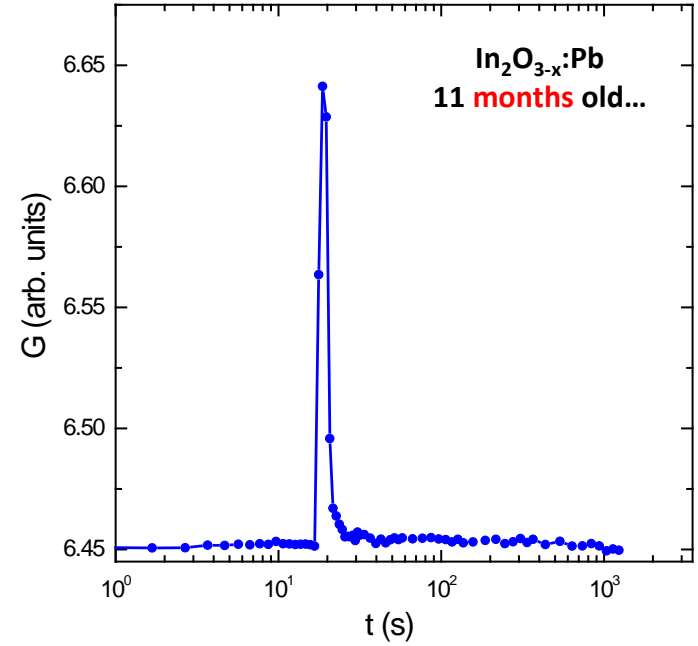
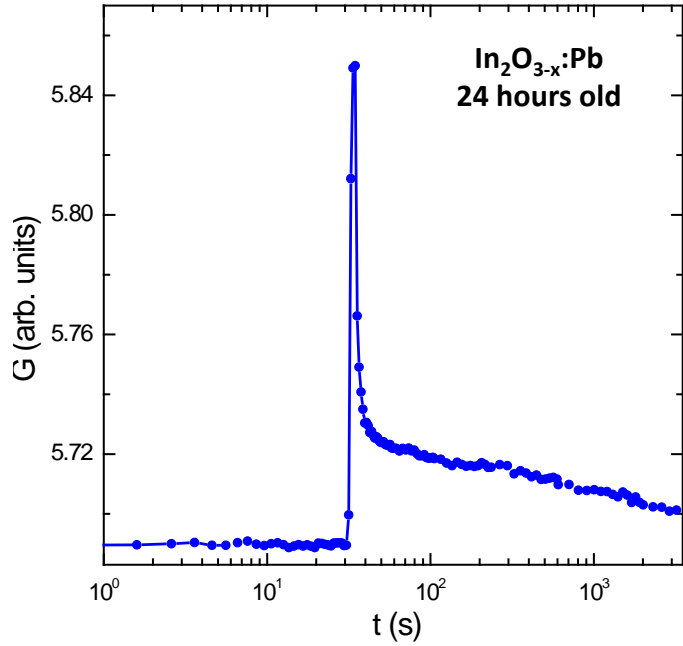


$\text{In}_2\text{O}_{3-x}$ (un-doped)
Crystallized at 560K

$\text{In}_2\text{O}_{3-x}$ (un-doped)
Crystallized at 850K

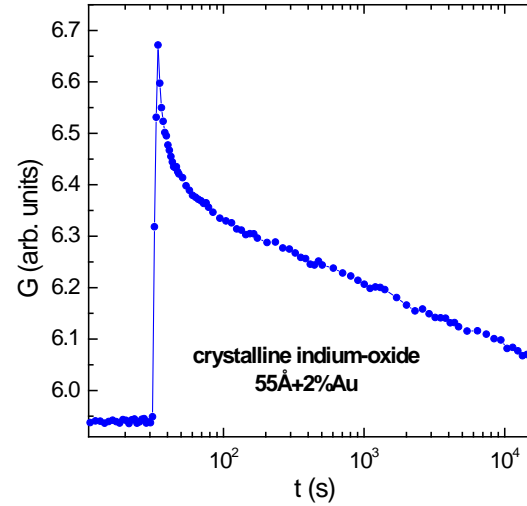
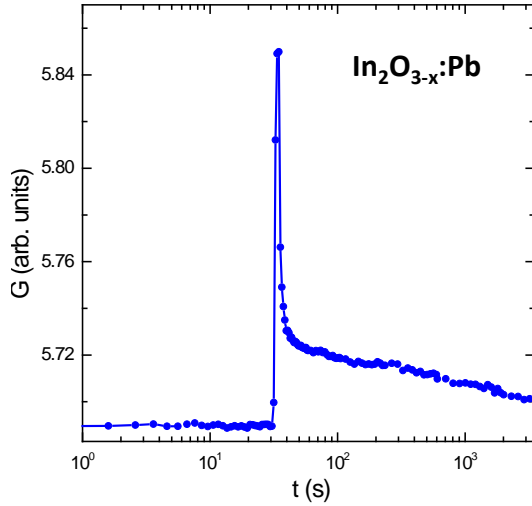


...not all that's heavy is Gold...
doping with Pb instead of Au?

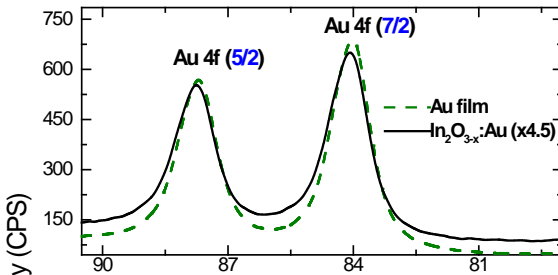


What is the difference between Pb and Au?

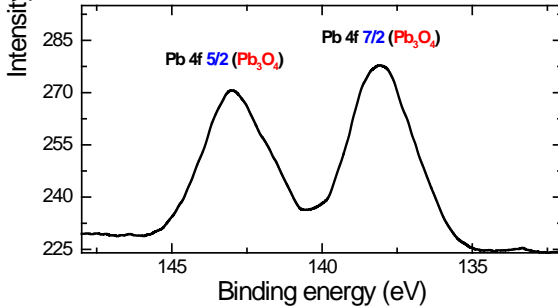
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XPS

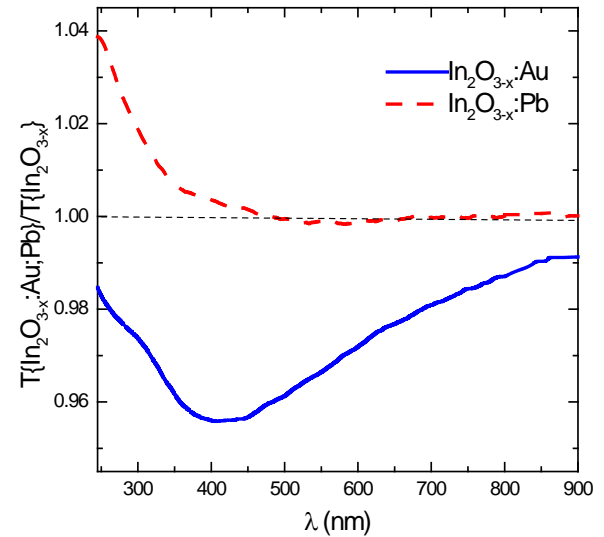


Au resides in Oxygen vacancies

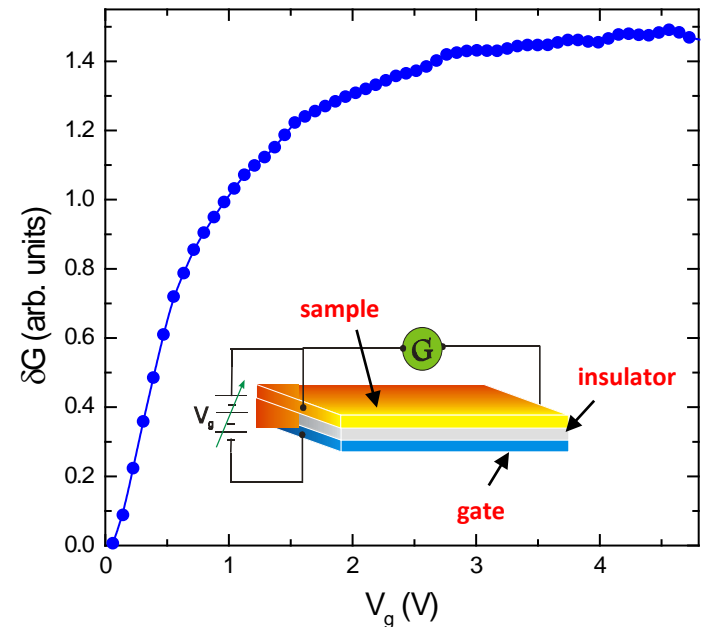
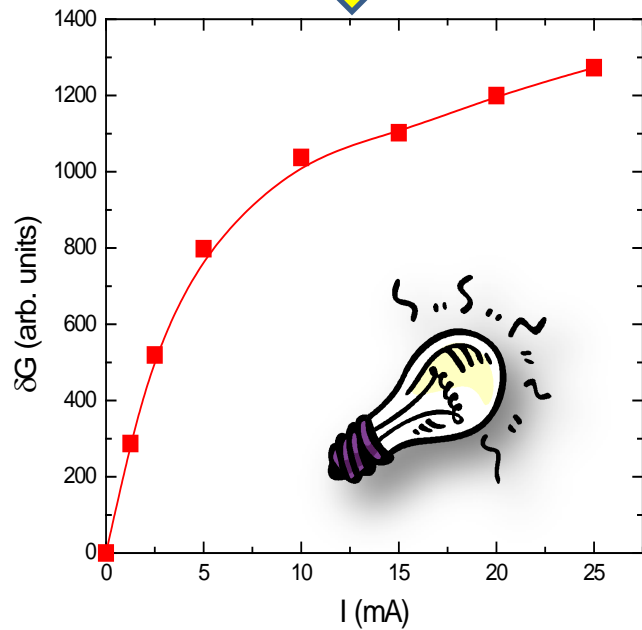
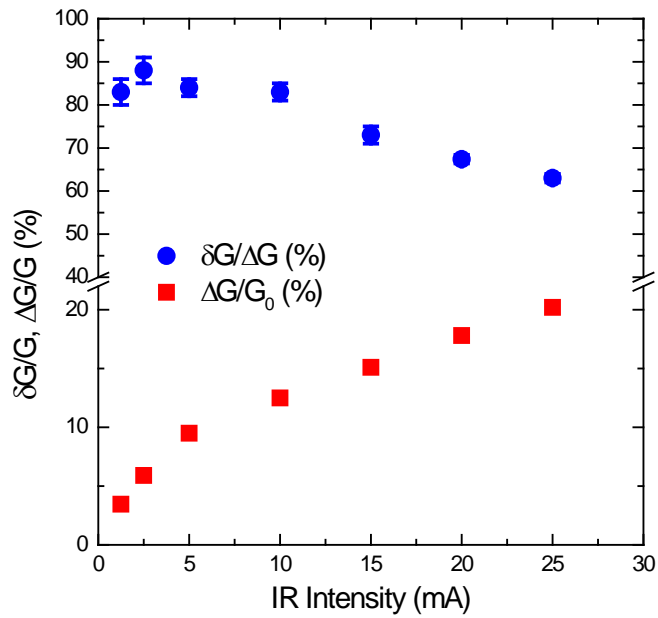


Pb replaces In (or as interstitial)

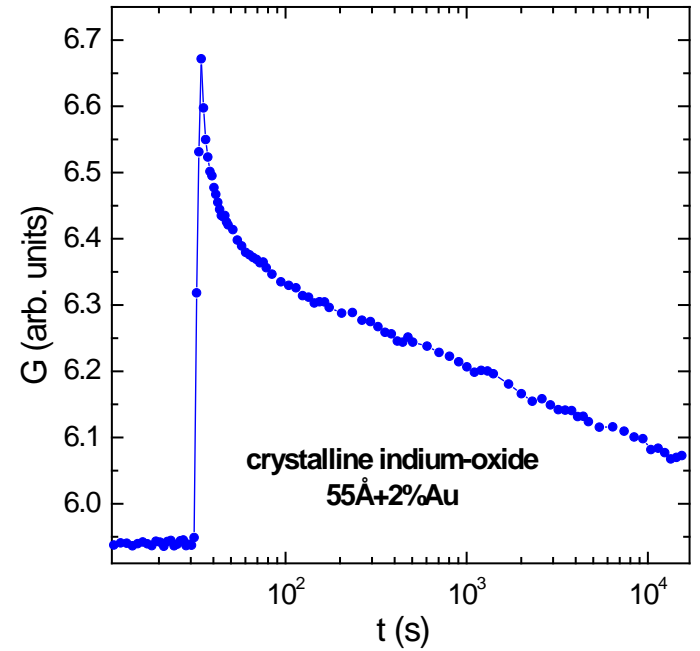
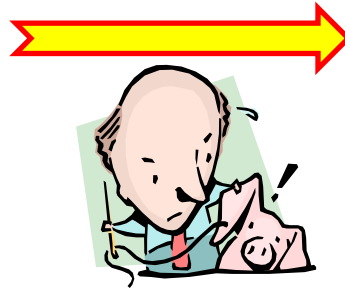
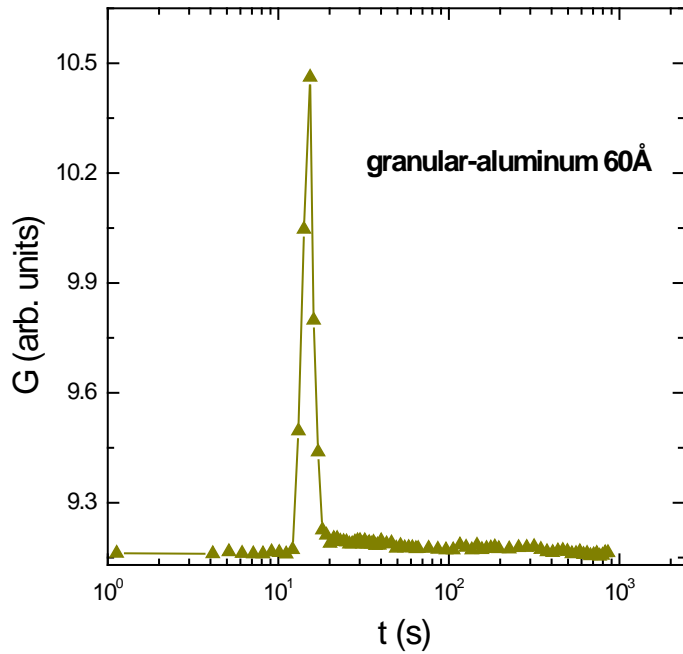
Spectroscopy



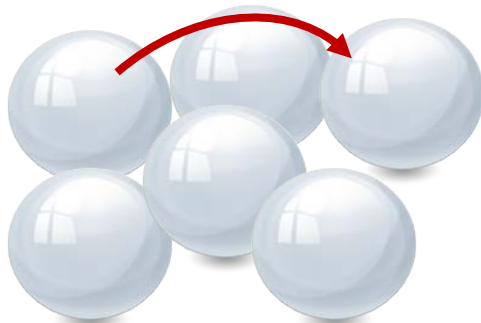
...some stuff we can already do...



...what we can *not* yet do...



...difference between granular system and Anderson insulator...



$$\hbar\omega$$

