Dynamics of Electronic states in the aperiodic crystal La_2VS_3 and in the Mott insulator Sr_2IrO_4.

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We will present time resolved photoelectron spectroscopy data of the misfit compound La_2VS_3 and of the Mott insulator Sr_2IrO_4. Despite of the metallicity predicted by band structure calculations, both compounds are insulating up to high temperatures. The breakdown of the Fermi liquid theory is monitored in the reciprocal space by angle resolved photoelectron spectroscopy. It follows that La_2VS_3 holds a pseudogap which scales as the incommensurate V-V distortion of the VS_2 layers. Upon photoexcitation, the electronic states relax energy in to phonon modes and the pseudogap is partially filled. In contrast to charge density wave compounds, the observed dynamics is faster than 80 fs. We ascribe the sudden melting of the pseudogap to the strong electron-phonon coupling with the aperiodic V-V potential.
The electronic localization of in Sr_2IrO_4 has instead a different origin. This transition metal oxide holds indeed a Mott gap sustained by large spin-orbit interaction. Upon photoexcitation with moderate pump fluences, we observe large effects on the electronic states located well below the Fermi level. The temporal evolution of the band with angular momentum $J^{3/2}$ is compared with state of the art dynamical mean field theory calculations. It follows that the photoinduced broadening of the $J^{3/2}$ peak is naturally explained by the collapse of the Mott gap under non-equilibrium conditions.