# Highlights

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## Photoresponse dynamics in amorphous-$LaAlO_3/SrTiO_3$ interfaces

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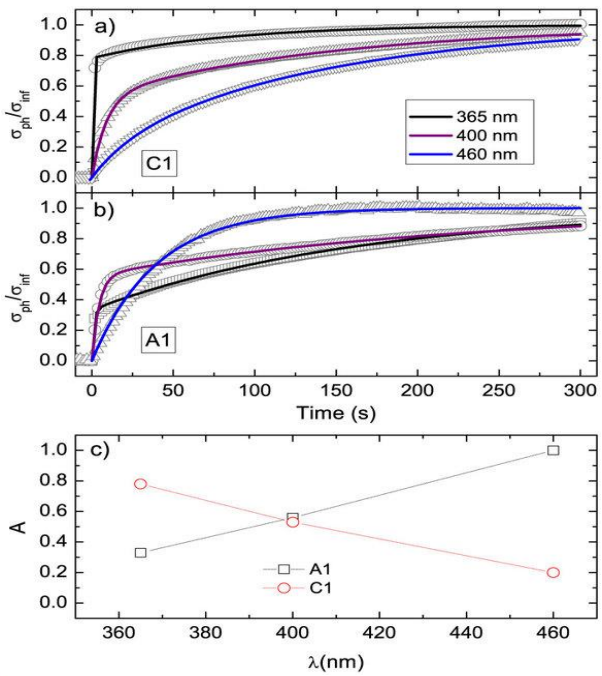
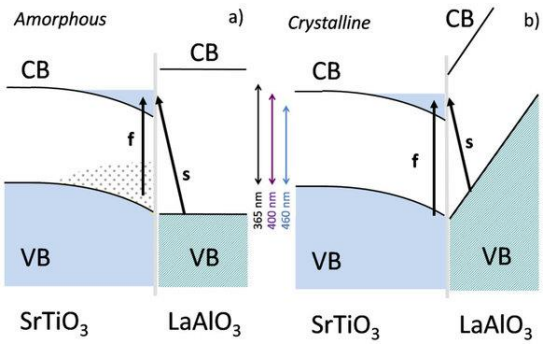
The time-resolved photoconductance of amorphous and crystalline $LaAlO_3/SrTiO_3$ interfaces, both hosting an interfacial 2-dimensional electron gas, is investigated under irradiation by variable-wavelengths, visible or ultraviolet photons. Unlike bare $SrTiO_3$ single crystals, showing relatively small photoconductance effects, both kinds of interfaces exhibit an intense and highly persistent photoconductance with extraordinarily long characteristic times. The temporal behaviour of the extra photoinduced conductance persisting after light irradiation shows a complex dependence on interface type (whether amorphous or crystalline), sample history and irradiation wavelength. The experimental results indicate that different mechanisms of photoexcitation are responsible for the photoconductance of crystalline and amorphous $LaAlO_3/SrTiO_3$ interfaces under visible light. We propose that the response of crystalline samples is mainly due to the promotion of electrons from the valence bands of both $SrTiO_3$ and $LaAlO_3$. This second channel is less relevant in amorphous $LaAlO_3/SrTiO_3$, where the higher density of point defects plays instead a major role.




(a) Photoresponse of C1 and (b) photoresponse of A1 at 365 nm (black), 400 nm (red), and 460 nm (green). The data are normalized to the asymptotic value $\sigma_{inf}$; solid lines are fit curves. (c) Dependence of A vs. radiation wavelength $\lambda$ for both samples.




Sketch of the band structure of a) a-LAO/STO and b) c-LAO/STO.