Time-resolved CARS study of graphene

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The single atom thick two dimensional graphene is a promising material for various applications due to its extraordinary electronic, optical, optoelectronic and mechanical properties. The demand for developing graphene based applications has entailed requirement for development of methods for fast imaging techniques for graphene. Earlier we reported FWM based non-destructive and fast imaging technique for graphene.[1] This method enabled following oxidation patterning process[2] of graphene, in real time, but provided little or no information about the dynamics of the system. Now, we have discovered that using back-scattering measurement geometry and BOXCARS excitation geometry, different FWM contributions and therefore different excitation processes can be differentiated. The measurement is conducted as 2D-time-resolved measurement corresponding to movement of probe and Stokes beams. The intensities of different signals are analysed, yielding a contour (**Figure 1**). The results of the main, three-colour, three-pulse contribution shows a CARS – type decay component with lifetime of ~350 fs, which we have assigned as coherent G band vibration relaxation of hot phonon.

References

[1] J. Koivistoinen, J. Aumanen, VM, Hiltunen, P. Myllyperkiö, A. Johansson, M. Pettersson, Appl. Phys. Lett., 108 (2016) 153112

[2] J. Aumanen, A. Johansson, J. Koivistoinen, P. Myllyperkiö, M. Pettersson, Nanoscale, 7 (2015) 2851-2855.

Figures

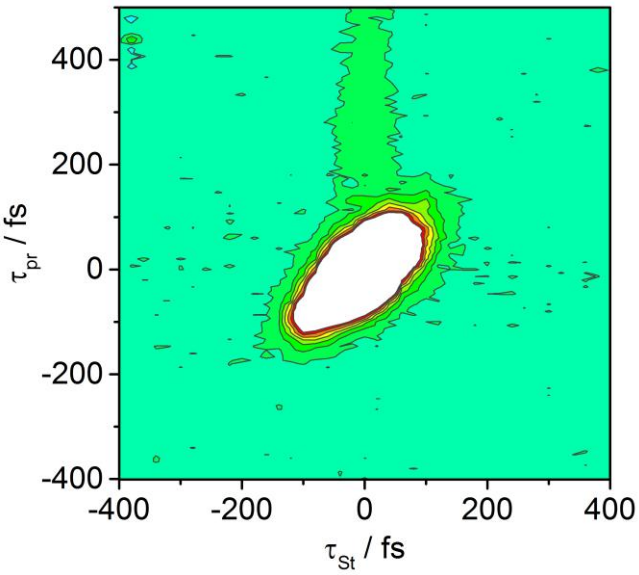

Figure 1: Three-pulse CARS of graphene