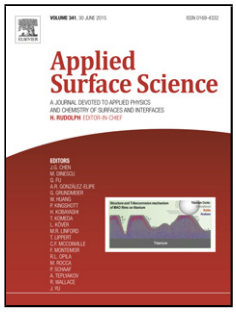

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Femtosecond laser induced nanostructuring of graphite for the fabrication of quasi-periodic nanogratings and novel carbon nanostructures

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Highlights of the work:

- We have studied experimentally in detail about the femtosecond laser irradiation effects on bulk graphite.
- We have observed the laser polarization, fluence and energy dependent quasi periodic nanogratings on the surface of the graphite.
- The FESEM images reveals the formation of fluence dependent quasi-periodic deep-subwavelength nanogratings (Λ = 130-230 nm) on the surface.
- The Raman spectra show a clear formation of multi-layered or few layered graphene, graphitic flakes and graphene quantum dots.
- High resolution TEM shows the few layered edges of graphene or nano graphite.
- When the ablation was performed in water we have observed blue luminescent graphene quantum dots in the solution along with carbon nanostructures.
- The SERS studies show the formation of different carbon nanostructures in water.

Abstract: Here we have experimentally studied ultrafast femtosecond laser ablation of graphite in air and water environments for the fabrication of promising nanostructures on the graphite surface and also nanographite flakes, graphene quantum dots in water. After the fs laser irradiation in air quasi-periodic nanogratings were found on the graphite surface and when the irradiation is done in water we observed graphene quantum dots (GQDs) and graphitic flakes dispersed in the solution. The sheets consist of few layers of spongy kind of