

## ABSTRACT

Novel nano-dyad of homoleptic sandwich-type phthalocyanines with nitrogen doped graphene quantum dots for nonlinear optics

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The syntheses of neodymium(III) 2,9,16,23-tetrakis-(2,6-di-*tert*-butyl-4-methylphenoxy)phthalocyanine (**2**), bis europium(III) 2,9,16,23-tetrakis-(2,6-di-*tert*-butyl-4-methylphenoxy)phthalocyanine (**3**), bis dysprosium(III) 2,9,16,23-tetrakis-(2,6-di-*tert*-butyl-4-methylphenoxy)phthalocyanine (**4**) and their conjugated analogues with nitrogen doped quantum dots (NGQDs) are reported herein. The optical nonlinearity of the sandwich-type phthalocyanine complexes and their conjugates with NGQDs were studied in dimethyl sulfoxide using the open aperture Z-scan technique at an excitation wavelength of 532 nm with a 10 ns pulse. The nonlinear absorption coefficient ( $\beta_{\text{eff}}$ ) value of the samples ranges from 15 cm GW<sup>-1</sup> to 89.6 cm GW<sup>-1</sup>. Complex **4** and its conjugates afforded a strong optical limiting behaviour compared to the other samples. These fabricated complexes and their conjugates with NGQDs could serve as a plausible nonlinear optical (NLO) material due to their fascinating NLO properties.