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Isotopic Fingerprints in the Luminescence of Deep Defects in Silicon

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In a series of recent papers [1, 2] we have shown that the dramatic improvements in spectral resolution made possible in highly enriched ^{28}Si can provide surprising new information on the detailed constituents of deep luminescence centers. The ‘isotopic fingerprints’ reveal the presence, and number, of different chemical species involved in the deep centers. While many of these luminescence centers have been studied for decades, this new technique revealed that *none* of these was what it was thought to be. Armed with this new information, many new centers have been discovered, containing either four or five atoms chosen from among: Cu, Ag, Au, Pt and Li. There is at present no theoretical explanation for the stability and ubiquity of these centers in rapidly thermally quenched silicon.

[1] M. Steger et al., Phys. Rev. B 81, 235217-1-6 (2010).

[2] M. Steger et al., Phys. Rev. Lett. 100, 177402-1-4 (2008).