BlackBerry Quencher 650 (BBQ650) is classified as a dark quencher (a non-fluorescent chromophore). Dark quenchers are extensively used as the 3’-quencher moiety in a variety of Fluorescence Resonance Energy Transfer (FRET) DNA detection probes in which the fluorophore has a long wavelength (yellow to far red) emission maximum (e.g. Cy3, ROX, Cy5, Cy 5.5). Dark quenchers can serve in this role because they have long wavelength absorbance maxima. Dark quenchers are primarily used in nucleic acid assays, but also find a place in nucleic acid structural studies (1). Examples include TaqMan probes (2), Scorpion primers (3), and Molecular Beacons (4).

BBQ650 has an absorbance maximum of 650 nm, and an effective absorbance range of 550-750 nm (yellow to far red). It is chemically resistant to both oligonucleotide synthesis reagents (iodine, TCA) or deblocking solutions (ammonia, AMA). Consequently, for synthesis of longer oligos (> 50 bases), BBQ650 is the preferred quencher over BHQ-2 or BHQ-3, as the latter are chemically less stable, and degrade when exposed to oligo synthesis and deprotection conditions for long periods of time, such as when synthesizing or processing longer oligos. A list of specific fluorescent dyes compatible with BBQ650 is found at this link.

The advantages of using BBQ650 as a dark quencher in a FRET probe are (a) low background fluorescence (and thus better signal-to-noise ratio), (b) higher dynamic range, (c) amenability to multiplex assays (due to a dark quencher having no secondary fluorescence), and (d) ease of synthesis of FRET probes (due to BBQ650 being resistant to degradation during the oligo deprotection step).

Quencher Spectral Data

Quencher

Absorption Max, nm

Quenching Range, nm Dabcyl 453 380-530 BHQ1 534 480-580 BHQ2 579 550-650 BHQ3 672 620-730 BBQ-650 650 550-750
References