Chalcones,   
,-unsaturated aromatic ketones, constitute the central skeleton of many

important biological compounds [1] and are the biosynthetic precursors of flavonoids and

isoflavonoids in plants [2,3]. Their diverse structures can cyclize to form various flavonoid

compounds with different biological activities [4,5]. In the past decades, many synthetic

analogues, such as aza-chalcones and chalcone derivatives containing isoxazole, pyrazole,

and indole, [6] were developed and have shown interesting biological properties, such as

antioxidant, anticancer, antimicrobial, antiprotozoal, antiulcer, antiviral, antihistaminic,

anti-HIV, cytotoxic, and anti-inflammatory activities [7–9]. Moreover, chalcones with a

suitable electron push–pull arrangement of functional groups were reported to exhibit

bright fluorescence [10–13] (Figure 1), which is applicable for bioimaging. However, their

photophysical and photochemical properties have not been systematically investigated for

biological applications [14,15].

We are particularly interested in exploring chalcones with fluorescent properties

and use them for biological applications, such as cellular imaging and microorganism

targeting. To achieve these goals, the development of chalcone-based fluorescent dyes with

mega-stokes shifts and high photo-stability is important [16,17]. First, a mega-stokes shift

(>100 nm) is an essential factor for bioimaging because it can provide a better signal-tonoise

fluorescence [18,19]. Some commonly used fluorescent dyes, such as fluorescein [20],