**Due to new requirements on formatting issued by the Journal of Physical Chemistry effective June 1, 2013, we are sending you a checklist to assist you in revising your manuscript formatting.  
  
The following items need to be corrected.**  
**1) Reference formatting is incorrect. (#10-11-12-13 on the checklist)  
   
    (a) Article Titles are now required with ALL titles to be written in title case.  
    (b) Last Page numbers are required.**

These items have been fixed,

**2) Figure 4 is not mentioned in the text.  
  
3) Figure 6 is mentioned (pg 14) not is not shown.**  
The mention of Figure 6 was supposed to read “Figure 4,” and has been fixed in the manuscript, which should address both items 2 and 3.  
  
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**Reviewer(s)' Comments to Author:  
  
Reviewer: 1  
  
Recommendation: This paper is publishable subject to minor revisions noted.  Further review is not needed.  
  
Comments:  
This work reports experimental study of exciton transport in conjugated polymers using a doping dye molecule as a probe with time-resolved fluorescence.  A diffusion model was used to account for the key features and determine the diffusion length of interest.  The work is well designed and carefully executed.  The results are of good quality and the analysis is thorough and insightful.**  
**I only have one minor question for the authors to consider: in the model, is dye is probably assumed to be very small, equivalent to a point.  Is it possible to include a finite size of the dye molecule in the model?  In relation, since the dye does have a finite size, could or how would this affect the data interpretation?**

The simulations use a continuum model to handle the structure of the polymer. While the dyes are essentially points within this continuum, they are given some finite volume via the calculated Förster radius, which can be converted into a volume. As excitons propagate along the continuum, the probability of exciton transfer increases as the exciton moves nearer to one of the dye points. Giving the dyes a finite size would increase the Förster radius marginally (the effect of changing the Förster radius on simulation results is outlined in the SI), but also slow down computing times due to adding a granular element (the dye size/shape) to the continuum. This will be mentioned in the Supporting Information. [paragraph draft: One possible way to account for the finite size of the dye without completely changing the model would be to include an exclusion volume around each dye, to prevent occurrence or diffusion of excitons within the volume. However, it is expected that the addition of an exclusion volume would have a minimal impact on the quenching dynamics and on the quenching efficiency, since the volume of the dye is less than 2% of the nanoparticle volume. Similarly, the dye volume is smaller than the quenching volume by a factor of 20 or more. Finally, we note that in previous simulations,[ref] we employed a discrete lattice model, and found that the quenching efficiency obtained was not sensitive to the lattice spacing, for lattice spacing of 0.1 to 0.4 nm, which is consistent with the reasoning above.]

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**Reviewer: 2  
  
Recommendation: This paper is publishable subject to minor revisions noted.  Further review is not needed.  
  
Comments:  
Manuscript entitled “Measurement of Exciton Transport in Conjugated Polymer Nanoparticles” by McNeill and coworkers reported is an important and eligant method for assaying the exciton transport in conjugate dye dopred polymer nanoparticles. Experimental as well as the simulations are carefully performed and the conclusions are resonable. The result presented here will shed light in the fundamental photophysics of CNP and their application in making photovoltaic devices and single fluorescence emittor.  
I recommend this manuscript for publication in JPC.  
I have following comments on this manuscript:**

**Major comments:**1. **The percentage of dopant inside the CPN is completely determined based on the concentration ratio of dopant and CPN. Percentage of dye doping is based on the assumption of “…. expecting most of the dye is incorporating into the CPN….” For the homogeneity of the sample they used brief sonication. Authors need to make comments on the homogeneity and elaborate the CNP preparation procedure mentioning sonication time, frequency for sonication, temperature etc. How the authors assumed that all the dyes were incorporated into the core? Is there any experimental proof that all the perelene dyes were incorporated into the core ?**

The sonication time of our sample is ~30 s at 40 kHz and room temperature. [regarding the particle prep, we have included additional detail...] In our 2008 J. Phys. Chem. C publication, we performed centrifugal concentration of a sample of Coumarin 6 doped polyfluorene CPNs and measured the absorbance and fluorescence of the filtrate. Negligible absorbance and very weak fluorescence from Coumarin 6 was observed, indicating that the majority of the dye is embedded in the polymer matrix. The process was repeated a few weeks later and no dye leakage was observed. Given that the molecular weight of the PFBT copolymer is a factor of 3 less than the polyfluorene polymer used in the above mentioned article, and the perylene red dye is at least as large, if not slightly larger than Coumarin 6, we can expect similar results. This will be mentioned in the Supporting Information.

-need to add the possibility of perylene-red-only aggregates

-need to add a reference to 2008 paper, and relevant discussion to the manuscript

**2. For simulation a modelling of exciton diffusion and energy transfer are imported here. To obtained the desired result they varied several parameter but they assumed the nanoparticles as a sphere only and they gave priority to quenching by defects- but why they only restricted the simulation with spherical particle and quenching by defects only? Apart from AFM is there any indication that the CNP are spherical?**

Regarding the assumption of quenching by defects, this is justified based on prior results reported by us and others that the primary quenching species is hole polarons (i.e., cations). However, we are purposely somewhat vague about the nature of the quenching defect, since our proposed modeling approach should be valid for different types of defects. Perhaps we mistakenly gave the impression that the defects are synthetic defects, and have changed the manuscript to remove that ambiguity. Additionally, the assumption of the existence of quenchers is a key part of the model we are testing--the assumption is provisional, and if there were no quenching species evident in the results, we would have obtained a defect concentration of zero.

Regarding the assumption of spherical shape, we and others have addressed this previously. Appropriate references have been added to the manuscript.

-add appropriate text and reference to us as well as Terentjev et al., to manuscript.

-add text clarifying that, within the context of the model, we could be discussing a range of defect types, and that in this particular case (PFBT), there is other evidence that polarons are involved.

**Minor comments:  
3. Diffusion length LD = (2nDτ)1/2 , but author claim that the diffusion length increased by factor of two where the lifetime of excited state is reduced. This needs elaboration for the non-expert readers.**

This has been clarified in the text. [need to re-word the text, to make it clear that we are talking about what the diffusion length would be, in the absence of quenchers, which indicates some possible room for improvement in terms of materials properties, and gives some idea of the limits on exciton diffusion in these materials. Perhaps we need to introduce a term, “intrinsic diffusion length”, and define it as the diffusion length that would be obtained for the material in the absence of quenching.]

**4. Although there is red shift in the emission maxima but the quantum yield of CPN is getting lowered with the increment of dopant (perelene dye) amount, with this result how the author claims that such CPN is useful for multicolour imaging and tracking purpose?**

At low-to-moderate doping levels, the fluorescence quantum yield remains at or above 0.10. Since there is typically overlap between the emission spectrum of autofluorescence (which typically exhibits a small Stokes shift) and that of the fluorescent label, there is usually a tradeoff when choosing a filter set, between maximizing the fraction of the emission spectrum collected and rejection of autofluorescence. Therefore, an increased separation between excitation and emission typically leads to higher signal levels and better rejection of autofluorescence. We have modified the text in order to clarify this issue.

Draft paragraph: In microscopic imaging experiments, signal levels and contrast are affected by several phenomena and factors related to the experimental setup.[ref] A key issue is autofluorescence from the sample and from the various optical materials. Autofluorescence typically peaks a few nm to the red of the excitation wavelength, with a long red tail. Thus, for typical dyes with small Stokes shifts, selection of filters involves a compromise between efficient collection of the emission of interest and rejection of autofluorescence. The PFBT nanoparticles doped with perylene red exhibit a large red-shift in the emission, which is advantageous for efficient collection of fluorescence and rejection of autofluorescence.

**5.** **Fig 3a, undoped decay looks quite wavy in nature and is there any rise in the initial part?**

There is no rise in the initial part--emission is prompt, to within the time resolution of the setup. The waviness apparent in some of the decay traces is possibly due to afterpulsing in the single-photon APD detector, stray reflections in the apparatus reaching the detector, or nonlinearities in the time-amplitude converter (TAC) or multi-channel analyzer (MCA) within the TCSPC setup. These effects are prominent only in samples with a lifetime greater than ~2 ns. The effect on the determined fluorescence lifetimes is minor, and has been cross-checked with several standard dyes, including fluorescein in 0.01 M NaOH (τ = 4 ns), Coumarin 6 in ethanol (τ = 2.5 ns), and perylene red in THF (τ = 5.6 ns). All lifetimes measured were within 10% of literature values. A paragraph discussing the validation of the apparatus and addressing these concerns has been added to the Supporting Information.

**6. Fig 4b in the inset needs scale for X-axis.**

The x-axis is identical for both Figure 4b and the inset. I will make that more explicit in the figure itself.