

Abstract Submitted
for the MAR07 Meeting of
The American Physical Society

Optical Properties of Molecular Dots TIMOTHY RUSSIN¹, GUN-
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versity — A “Molecular Dot” (or “M-dot”) refers to a mixed organic/inorganic phase
of nanomatter where a small number of organic molecules are encapsulated in an
inorganic nanoparticle. Particular interest has been initiated in these systems when
the molecules exhibit photoluminescence (PL) and the nanoparticle provides a trans-
parent medium allowing easy entrance and exit of photons. They show promise for
medical applications. In preliminary experimental studies, the encapsulation has
been found to enhance the PL and suppress the photo-degradation of organic dye
molecules such as Rhodamine B encapsulated in SiO₂ or CaPO₄. In this paper, we
present the results of an optical model to predict the optical properties of M-dots.
Using the discrete dipole approximation, we take into account the effects of Mie
scattering and the effective dielectric function of the dye molecules encapsulated in
an inorganic host of known refractive index. The results of the modeling will be
compared to recent experimental results on M-dots in dilute solution, i.e., optical
absorption and dispersion in the NIR-Vis-UV regions.

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Date submitted: 20 Nov 2006

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