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Color tuneable fluorescent carbon dots for white light and bio-imaging application

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Development of efficient, inexpensive and environmental friendly light emitters, particularly devices that produce white light have drawn intense interest due to diverse applications in the lighting industry, photonics, solar energy and others. We present a simple strategy for the fabrication of flexible transparent films exhibiting tuneable light emission through one pot synthesis of polymer matrixes with embedded carbon dots assembled *in situ*. Importantly, different luminescence colors were produced simply by preparing C-dot/polymer films using carbon precursors that yielded C-dots exhibiting distinct fluorescence emission profiles. Furthermore, mixtures of C-dot precursors could also be employed for fabricating films exhibiting different colors. In particular, we successfully produced films emitting white light with attractive properties (i.e., warm white light with a high color rendering index) – a highly sought after goal in optical technologies. Development of new imaging tools for cancer cells *in vitro* is important for advancing cancer research, elucidating drug effects upon cancer cells and studying cellular processes. We showed that fluorescent carbon dots (C-dots) synthesized from folic acid can serve as an effective vehicle for imaging cancer cells expressing the folate receptor on their surface. The C-dots synthesized through a simple one step process from folic acid as the carbon source exhibited selectivity towards cancer cells displaying the folate receptor, making such cells easily distinguishable in fluorescence microscopy imaging. Biophysical measurements and competition experiments both confirmed the specific targeting and enhanced uptake of C-dots by the folate receptor expressing cells. The folic acid derived C-dots were not cytotoxic and their use in bio imaging applications could aid biological studies of cancer cells, identification of agonists/antagonists and cancer diagnostics.

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