Strongly confined HgTe 2D nanoplatelets as narrow near infrared emitter

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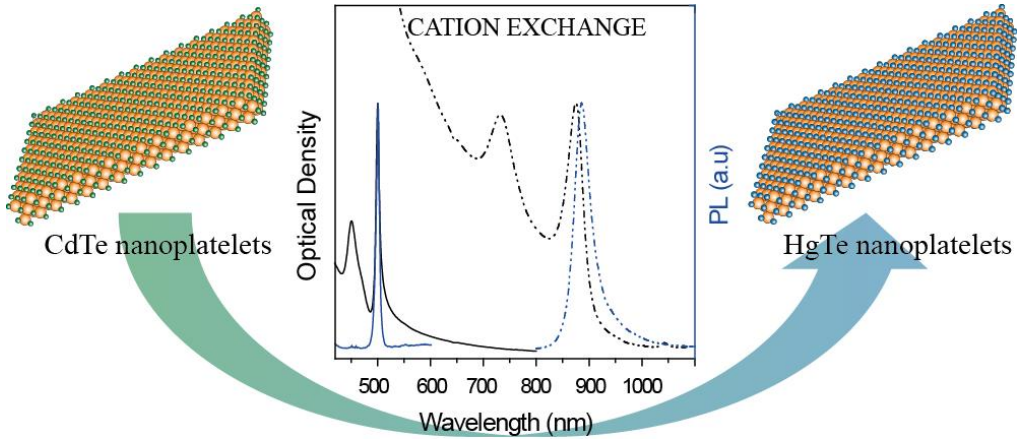
The recently developed 2D colloidal nanoplatelets (NPLs) have demonstrated improved photoluminescence linewidth for cadmium chalcogenides semiconductor[1]. Unfortunately these properties are limited to the visible range. Currently, PbS and CIS (copper indium sulfur) QDs are promising emitters for the near IR, however these materials have broad luminescence features[2] (>100nm). Here we synthesize HgTe nanoplatelets through cation exchange[3] on CdTe NPLs. In order to slow down the exchange bulky mercury amine complex are used. The obtained HgTe NPLs present exceptionally narrow near IR optical feature (57 meV for an emission around 890 nm) and an emission quantum yield in the order of 10%. These optical proprieties have never been observed. Moreover the band edge energy can be tune thanks to the surface chemistry because of the partial delocalization of the wavefunction into the ligands shell. Finally, we observe a switching of the carrier conductivity from p type in CdTe to n type in HgTe.



Optical density and photoluminescence of CdTe and HgTe after cation exchange

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