Iron Pyrite Nanocrystal Inks for Low-cost Photovoltaics: Surface and Material Design

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Research Motivation

Iron pyrite: Fool’s gold for photovoltaics

Proposed Mechanism

Material Characterization and Device Fabrication

Increased Stability and Photoresponse by Ligand

Alloyed ZnFe1−xS2 Nanocrystals

Band Gap Broadening and Dark Current Reduction

Conclusions

References

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& XRD and Raman: phase pure iron pyrite with high crystallinity
& SEM: cubic shaped NCs
& High absorption efficiency (~2 eV)
& Dip coated FeS NC thin films with smooth surface (roughness of 65 nm)
& Simple spin or dip coating to construct NC thin films for photovoltaics
& Shortening of the S-S bond observed by Raman spectroscopy is expected to further improve the stability of iron pyrite.

Band gap enlargement with increased zinc alloying.

Increased photoresponse with zinc alloying was achieved in the ZnFe1−xS2 NC devices resulted from reduced dark current that was related to eliminated defect states.

We have synthesized uniform, phase pure, and air stable pyrite FeS2 NCs.

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