**Chalcogenide Materials: Novel Compositions and New Applications**

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In this talk, we describe our recent work on selenium modified Ga:La:S glasses. The addition of Se improves the infrared transmission sufficiently to capture enough of the 8-12 micron window to allow thermal imaging, while at the same time, allowing sufficient visible transmission for object recognition using conventional image capturing. The addition of Se has other implications, increasing the optical nonlinearity, providing longer fluorescent lifetimes when doped with rare earth ions and expanding the transmission window in the important 3-5 micron region. Ga:La:S glasses are superior to commercially available chalcogenides based on alloys of Ga and/or As with S, Se and/or Te. They offer significantly higher alkaline resistance, greater mechanical strength and over 300oC higher working temperature (Tg > 500oC). All of these new features suggest Ga:La:S-Se may be a material suitable for the next generation of mid-IR sources through supercontinuum or rare earth doping.





Figure 1 (a) Compositional modification of Ga:La:S glass1, (b) thermal imaging in the 8-12 micron band2 and (c) supercontinuum generation GLS.

REFERENCES

1. Ravagli, Andrea, Craig, Christopher, Alzaidy, Ghadah, Abdulrahman, Bastock, Paul and Hewak, Daniel (2017) Optical, thermal, and mechanical characterization of Ga2Se3-Added GLS glass Advanced Materials (doi:10.1002/adma.201606329)
2. Ravagli, Andrea, Craig, Christopher, Lincoln, John and Hewak, Daniel (2017) Ga-La-S-Se glass for visible and thermal imaging Advanced Optical Technologies (doi:10.1515/aot-2016-0069).