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Tellurium based glasses for far infrared and thermoelectric applications

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The glass-forming ability of chalcogen elements has been known for several decades but compared to classical oxide glasses, this class of vitreous materials is just emerging in particular in order to shape optical lenses or fibers. Indeed, they look like metallic alloys rather than classical glasses, and their main interest relies on their large optical window extending in the mid-infrared. This exceptional transparency, associated with suitable viscosity/temperature dependence is a favorable context to seize the opportunity to develop innovative optical fibers for mid-infrared sensing in biology and medicine for example. Recently, some new families of glasses, based on tellurium, have been developed to extend the working domain of these sensing devices. In particular, they give access to the CO_2 absorption band in the mid-infrared which is useful for the Darwin mission of the ESA on one hand, and in the context of the strike against the global warning on the other hand. Also, due to their unusual high electrical conductivity, some tellurium based glass compositions appeared as nice candidate for thermoelectric application as soon as they are doped with metallic elements such as copper. The talk will be devoted to the description of this atypical family of glass and their applications for the mid-infrared sensing as well as for thermoelectricity.

Biography

Bruno Bureau is Professor in Material Sciences and works on the glass formation processes by synthetizing special materials based on selenium and tellurium. His group develops optical devices for mid and far-infrared sensing for medical applications or space optics for example. He is the author of about 150 papers and about 25 invited talks in the field of non-oxide glasses, infrared sensing, optical fibers; material and glass science. He received the Yvan Peychès award from the French Academy of Sciences in 2009. He has co-founded the DIAFIR Company in 2011 and is currently appointed to the "Institut Universitaire de France".

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