08-037

Preparation and characterization of performs and optical fibers based on tungsten lead-pyrophosphate glasses for photonic applications

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Glasses containing heavy atoms such as Pb and W are promising materials for near infrared technologies, non-linear optics and design of new laser devices. Phosphate glasses containing these atoms have been investigated because of their structural and optical properties, including low phonon energy (~1100 cm-1), extended infrared transmittance (from 0.4 ?m to about 4 ?m), high non-linear and linear refractive indexes and good rare earth ions solubility. Moreover, these glasses also exhibit good mechanical, thermal and rheological properties which enable optical fiber production. In this work, we report the result on the processing and characterization of performs and multimode optical fibers based on Pb2P2O7-WO3 binary glass system, considering the high non-linear index not found in others phosphate glasses compositions. In order to check the thermal and optical properties of core and cladding composition, the glass bulk was characterized by DSC, UV-visible absorbance, infrared transmittance and M-Lines spectroscopy. For preform production Cr3+ was used as tracer to assess core quality and uniformity across 50 mm length preform. By Raman fluorescence of Tm3+ ions contained into the core, we also mapped the interface between core and cladding that reveals a small interface around 40 ?m for a 10.11 mm of preform. Then, the step-index optical fiber was then drawn by pulling the preform using as optical fiber drawing tower at the Institute of Chemistry, UNESP, Brazil. The resulting fiber has an index step of (0.007 ± 0.002) between core and clad composition at 633 nm and numerical aperture 0.167. The cutback method will be employ to characterize the optical fiber loss at visible and infrared ranges.