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### Novel sensitive sensors of intracellular viscosity and potential anticancer theranostic agents prepared on the porphyrazine pigments platform for specifically personalized medicine

The various techniques available for cancer diagnosis and therapy are traditionally considered as separate approaches in medical care. But nowadays development of the multifunctional agents which combine modalities for cancer diagnosis, treatment and real-time monitoring of treatment progress is real imperative for specifically personalized medicine. Here we report series of novel tetracyano-tetra(aryl) porphyrazine dyes which are found to be red-emitting fluorescent 'molecular rotor' i.e. the fluorescence lifetime and the quantum yield of these macrocycles strongly increase as a function of environment viscosity. On the other hand, they work as an efficient PDT sensitizer, i.e. it induces apoptosis and necrosis in cells upon irradiation with red light through formation of singlet oxygen. We demonstrated that PDT *in vitro* and *in vivo* using cyano-aryl porphyrazine macrocycles is accompanied by a significant viscosity increase by monitoring the fluorescence lifetime of the rotor. We suggest that this increase could be used as a completely new type of diagnostic and dosimetry tool during a PDT treatment providing feedback information about individual therapy status. In addition, the results of *in vivo* experiments showed that PDT sensitizers prepared on the cyano-aryl porphyrazine pigment platform bound to gadolinium cation demonstrate the potential to become an extraordinarily effective multimodal agent for theranostics, representing a new approach to PDT based on real-time monitoring of the therapy in combination with precise MRI /fluorescence diagnostics of tumors.

#### Biography

Larisa Klapshina received her PhD in 1992 from the Razuvaev Institute of Organometallic Chemistry of Russian Academy of Sciences, IOMC RAS, (Nizhny Novgorod, Russia). Currently she is a Senior Researcher at IOMC RAS and at the Laboratory of Optical Theranostics in Nizhny Novgorod State University. She and her group, work in organic and organometallic synthesis and the functional materials for bio-photonics and biomedicine. She is author of about 100 articles.

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