Fascination of luminescence phenomena and problem of “non-luminescence” phenomena

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We have commonly evaluated luminescent materials with optical measurements. For some luminescent materials about to practical use, we can directly see the fascinating light by eye. The visible light has been driving force not only for development of more captivating luminance, but also for empirical and intuitive inquiries. Despite the fascination of luminescence phenomena, the identification and minimization of “non-luminescence” processes should be primarily considered to boost the emission efficiency to a practical level. In a previous paper [1], two kinds of probing techniques of the “non-luminescence” processes, i.e., direct probing using electronic responses and indirect probing using the conversion of “non-luminescence” processes to luminescence process were introduced. In this workshop, we invite frontier researchers who are developing the direct probing techniques and applying them to actual materials (Drs. Iain, Ueda, and Fukada). Their works clarified importance of the “non-luminescence” processes.

Moreover, we discuss luminescence/“non-luminescence” processes which are commonly found in various materials independent of organic/inorganic, nano/bulk, and so on:

- ✓ Selective “non-luminescence” process dependent on ionic valency (Drs. Mikami and Ishigaki).
- ✓ Dynamical “non-luminescence” process determined by energy flow (Mr. Ohnawa)
- ✓ Deteriorative “non-luminescence” process as a result of competitive process between two emission-centers (Dr. Matsumoto).

Minimization of the “non-luminescence” processes has been demonstrated with ideas of doping control (Dr. Sugimoto) and structural sophistications such as micro-cavity (Mr. Inaba).

The sequential flow, i.e, Probing, Finding, and Minimization of the “non-luminescence” processes is shared between participants in wide scientific-fields and are applied to their works.

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[1] M. Ishii, OYO BUTURI (Monthly Publication of The Japan Society of Applied Physics), **85**, 223 (2016). (*in Japanese*)

光る過程は、成功事象に過ぎない。光る過程の探求より、むしろ「光らなかった」過程の測定法の確立、特定、最小化を進めることが、エネルギー損失の最小化、発光効率最大化のキーポイントではなかろうか。