a phase-matched ADP crystal. Threshold for oscillation of one of the dyes (Rhodamine 6G) was measured and found to be in the neighborhood of 100-200 kW. The spectral characteristics of the stimulated emission from this dye were briefly examined and found to be strikingly similar (except for the wavelength region in which the dye emitted) to those of DTTC iodide. The Rhodamine 6G stimulated emission band was ~200Å wide and, as the dye concentration was increased, shifted towards longer wavelengths away from the position occupied by the fluorescence peak. We anticipate finding similar results for the other dyes listed, with the possible exception of Acridone, which oscillates in a vibronic transition. Further study on these systems is in progress. [*Addendum received February 17, 1967*]

P. P. Sorokin and J. R. Lankard

Flashlamp Excitation of Organic Dye Lasers*: A Short Communication

Pumping with a specially constructed flashlamp rather than a giant pulse laser, we have just observed stimulated emission from three of the five dyes considered in the addendum to Ref. 1. In the table below we give some observations and results for the dyes in which lasing was thus achieved: Acridine Red, Rhodamine 6G, and Fluorescein.

Dye	*Solvent*	*Molar Concentration*	*Threshold Energy* [(b)] (*Electrical Input*)	*Output Energy* [(c)]	*Wavelength* [(d)] *of Laser Beam*
Acridine Red	Ethyl Alcohol	$\sim 10^{-4}$	~16J (8000V)	~10 mJ	6015Å (Orange)
Rhodamine 6G	Ethyl Alcohol	$\sim 10^{-4}$	~12J (7000V)	~70 mJ	5850Å (Yellow)
Fluorescein [(a)]	Water	$\sim 10^{-4}$	~36J (12000V)	Unmeasured	5500Å (Green)
Fluorescein [(a)]	Ethyl Alcohol	$\sim 10^{-4}$	~30J (11000V)	~1 mJ	5500Å (Green)

(*a*) Fluorescein di-anion (sodium fluorescein).
(*b*) Measured using broad band external mirrors with R ~0.95. Capacitance of energy storage bank, C = 0.5μF.
(*c*) Measured at 50-joule electrical input. External mirrors roughly selected for optimum output coupling in each case.
(*d*) Center of stimulated emission band. Bands are typically 100 Å wide.

The lamp we employed was of co-axial design, the discharge taking place in an air-argon mixture† in the thin (~1 mm thick) annular region between a thick-walled (quartz) outer cylinder and a thin-walled (quartz) inner cylinder.[2] The dye solution was contained in the inner cylinder; external mirrors were employed. The lamp assembly was mounted co-axially within a 0.5μF low-inductance disc capacitor‡ charged by a standard high-voltage power supply. The lamp was fired by reducing the pressure of the air-argon mixture until breakdown occurred. All three dyes produced brilliantly visible laser beams which were both photographed spectrally and recorded temporally.

The lamp was designed to be as fast as possible, in keeping with the considerations developed in Sec. 8 of Ref. 1. The measured base-width of the lamp pulse was about 0.8μsec. Peak lamp intensity was reached in 0.3μsec. *In the case of Rhodamine 6G the laser beam intensity commenced to drop before the lamp pulse had attained peak intensity.* It is our current belief that this pulse abbreviation does, indeed, reflect the loss associated with an accumulation of molecules in the triplet state.

References

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2. S. Claesson and L. Lindqvist, "A fast photolysis flash lamp for very high intensities," *Arkiv för Kemi* **12**, 1 (1958).

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† Typically, a 4:1 air-argon ratio was employed. At 14 000V the breakdown pressure for this mixture is in the neighborhood of 65 Torr.

‡ Tobe Deutschmann ESC 247-D.

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