

DDC NEWSLETTER

Volume 1, Number 1.

January 1, 2000

Who are we?

DDC does consulting on Phosphor Screen Optics, Photo-lithographic filters and Display Measurements. DDC is also a Sales Representative for Advanced Radiation Corporation (ARC). ARC is a manufacturer of Hg and Xe lamps used in the display, micro-electronics, medical and Photo-lithographic industries. DDC is also a distributor for other types of lamps, UV/visible radiation meters, Solar simulators etc. This first newsletter for Display Device Consultants includes the beginning of a twelve part series on the operation and issues associated with "high pressure" mercury lamps and xenon lamps. We also hope to include information concerning the display industry as part of our one page newsletter.

The first article on lamps is part of a paper written by Bob Eckel and Bob Donofrio on "Arc Lamps for Microelectronics" presented at the Symposium on Vehicular Applications of Displays and Microsensors held in September 22-23,1999 in Ypslanti Michigan. This Symposium was sponsored by the University of Michigan's Center for Integrated Microsystems and the Metropolitan Detroit Chapter of the SID.

Arc Lamps for Microelectronics (Part 1)

The discussion of lamps used in the manufacture of microelectronics naturally leads to the subject of mercury arcs. Mercury (Hg: Latin for hydragyrum) discharges are rich and efficient sources of actinic radiation which produces chemical changes in materials such as photoresists (PRs). It is difficult to discuss Hg lamp construction and lamp characteristics without discussing the equipment that they are used in. We will therefore frequently make mention of specific equipment developments with lamp modifications and improvements. We will first discuss some nomenclature on the Hg lamp spectrum. Then, we will look at the History of Hg arc lamps showing an arc lamp time line. We cover the structure of arc lamps and discuss the reason for the different shapes and materials used in the fabrication of the Hg arc lamp. The

Mercury Spectrum

"electronics and power supply requirements" is a large subject and will be covered elsewhere.

The spectral intensity distribution of a mercury arc is a function of the pressure of the discharge (and the presence of other gases such as Xenon). At the lowest pressure (microns of Hg) short wavelength radiation of Hg resonance lines of 185 and 254 nm are dominant. As the operating pressure of the discharge increases the resonance lines disappear due to self-absorption of the mercury vapor and the longer wavelength lines become more intense. At the highest pressures (60 atmospheres or more) a continuum is present and is a major contributor to the total energy output of the lamp.

Although the Handbook of Chemistry and other works will give the reader information of the spectral lines emitted by the excited mercury atom, the working nomenclature on some specific lines is less known. Table 1 below shows the wavelengths and line designations.

λ (nm)	Nomenclature
210-250	DUV
365.	I line
405	H line
436	G line
546.	E line

Table 1. Showing wavelength Nomenclature and line letter designation

In the table above, the band 210-250nm is known as deep ultraviolet (DUV). This short wavelength radiation produced in a "mercury-xenon" discharge is used to expose special PRs to print finer geometries than possible with the longer wavelength mercury line emissions.

Display News

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The Southwest Chapter of the Society for Information Display (SID) will be sponsoring a Symposium on Microdisplays on Aug. 8-9, 2000 in Boulder CO. Contact John O'Donnell at 602-436-7113 for further info.