



## CEO ON THE GO:

## An Interview with Dr. Abhinava Kumar Srivastava of NAND ipl

By Art Diamond, President, Diamond Research Corporation

**NAND & NANOTECHNOLOGY**

Born in India and educated in the UK, Dr. A. K. Srivastava is Managing Director of NAND ipl. Navran Advanced Nanoproducts Development Int'l. Pvt. Ltd.

is a high technology chemical and toner manufacturing firm focused on the research, development and commercialization of nanotechnology products.

Chemically produced toner (CPT) is the first imaging material to emerge from the company's state-of-the-art plant in Northern India. At the same time, NAND is supplying a diesel fuel additive called Econeev<sup>®</sup> that increases fuel efficiency and cuts green house gas emissions.

Dr. Kumar (as friends call him) was awarded BScE, MScE and PhD degrees in chemical engineering by the University of Manchester in England and was inducted as a Fellow of the Institution of Chemical Engineers in 2003. In addition to his engineering degrees, he earned an MBA at University of Warwick in England, which proved essential to the success of his international business ventures.

Upon leaving the academic world, Dr. Kumar joined Imperial Chemical Industries (ICI), one of the world's largest chemical companies in a league with DuPont, Bayer, BASF, Dow and Mitsubishi Chemical. ICI later demerged into AstaZeneca, a pharmaceutical firm and Avecia, a specialty chemical and biotechnology company. During his 14 years at ICI/Zeneca/Avecia, Dr. Kumar helped develop many new products and technologies, including color chemical toners. In 2006, Avecia's Ink Jet and Electrophotography business unit was acquired by Fuji Photo Film and renamed Fujifilm Imaging Colorants.

**NANOTECHNOLOGY & CPT TONER**

After moving to the United States in 2003, he joined a major international pharmaceutical company where he continued to work on chemical formulation, synthesis and the scale-up from laboratory to plant of new pharmaceutical products.

With the vision of setting up a business to commercialize and manufacture high technology products at low cost, he brought that expertise to India where it proved of extreme value in setting up the NAND operation. Dr. Kumar chose a plant location in Northern India where land is relatively cheap and there is plenty of room for expansion. At its R&D center, NAND ipl developed its new CPT manufacturing technology.

He said that the proprietary technology that NAND

commercialized has the advantage of more flexibility in adjusting toner properties compared to competitive technologies. NAND also developed technologies to manufacture all the base materials of nano sizes used for CPT production.

Dr. Kumar indicated that NAND is also interested in supplying some of the nano base materials, such as nano-sized pigments, to aftermarket toner or inkjet ink manufacturers. Looking ahead, he said "We plan to introduce nano pigments for applications in ink jet inks as well as color toners, both CPT (chemical) and CMT (mechanical) production processes. For ink jet inks, these would be supplied in the form of concentrated pigment dispersions."

He also pointed out that "There are a relatively large number of ink makers in China and India that represent an expanding market for these high technology colorants. Add to that customer base a much larger universe of colored plastic products.

In the form of molded objects, sheets and films and the opportunity for growth of our company is most promising."

**NANOTECHNOLOGY EXPLAINED**

"Nanotechnology," explains Dr. Kumar, "has been around for 20 to 30 years, but it is only recently that it has been used in a variety of fields including imaging, medicine fuel enhancement and other applications; He defines nanoparticles as those that are "equal to or less than 100 nanometers (0.10 microns) in diameter."

According to Dr. Kumar, "In reducing materials to a nano state, by mechanical grinding, milling, or by chemical polymerization or emulsification, their intrinsic properties are increased a thousand fold. This allows for enhanced effects with a much smaller quantity of material. It also allows for the design and synthesis of structured particles (such as CPT) with greatly improved properties."

For the explosives industry this increase in surface area, which can be measured in square miles per kilogram, make the powder available as a platform or carrier for another functional material. One of the most outstanding examples of nanotechnology is the use of finely-powdered silicasilica's and clays to convert nitroglycerine into dynamite.

**THE FUTURE FOR NAND'S COLOR CPT TONER**

Asked how he sees the future unfolding for aftermarket color toners, Dr. Kumar had these observations: First, color imaging is much more complex than monochrome, a reality that has discouraged consumers from purchasing any non-OEM product. Over time, however, and under the pressure of the current economy, which demands close cost control, small and medium size businesses are venturing into the color toner aftermarket.



Second, as end users become familiar with and confident in the use of color imaging, they are more inclined to try aftermarket toners. One of the factors that seems instrumental in convincing them to make the switch is learning that they can buy a chemical color toner from an aftermarket source.

And third, developing CPT requires an in-depth knowledge of chemical processing, which is new for existing mechanical toner manufacturers. This created a barrier of entry for many conventional toner producers. High capital investment made it even more challenging. Further, when OEM make frequent changes in the properties of their CPT toners, without an in-depth knowledge in chemical processing, it is difficult to make the required adjustments. To reduce that risk, NAND developed technologies to produce all of the key raw materials and produces them in its state-of-the-art manufacturing plant in Northern India.

NAND is trading on this factor by seeding companies in various regions of the world with its Bestone® CPT products. Dr. Kumar notes that "We are forming partnerships with key distributors and

remanufacturers. We are very flexible in the way we do business with our customers for the purpose of best meeting their needs. Bestone chemical color toner for the HP 1215 family of color laser printers is the first product that we have launched. As of this moment, its reception has been most gratifying.



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