

## Company Profile

**Industry Sector:** Pharmaceutical Manufacturing

**Company Overview:** TDA Research, Inc. develops materials and chemical processes that it can either manufacture or license. TDA has been in operation for 20 years, and employs 75 people, nearly all with degrees in either chemistry or engineering. TDA has 23 Ph.D.s on staff, developing novel materials and processes for the energy, chemical and pharmaceutical industries. In the past four years we have licensed and commercialized two major processes, the multi-ton manufacture of fullerenes and a partial oxidation process that removes sulfur from natural gas, both of which have multi-million dollar per year sales.

**Target Market(s):** Major pharmaceuticals and intermediates manufacturers worldwide.

## Management

**Leadership:**

Michael Karpuk, President

John Wright, Vice President

Girish Srinivas, Director, Business Development

Steven Dietz, Principal Scientist

## Key Value Drivers

**Technology:** Chiral drugs and intermediates can be made using homogeneous ruthenium phosphine catalysts with very high selectivity, eliminating the need for expensive chiral separations. Unfortunately, these processes suffer from problems. It is very difficult to remove the expensive catalyst from the reaction mixture and hydrogenations in the pharmaceutical industry have typically been carried out as batch reactions. We have developed an asymmetric hydrogenation process that allows the continual feed, reaction, separation and reuse of chiral ruthenium phosphine catalysts, resulting in dramatic savings in process costs.

**Competitive Advantage:** TDA's process allows easy catalyst recycle and removal from product. Switching from batch to continuous processing reduces the number of process steps, gives more consistent product quality and can reduce operating expenses by more than 90% and capital expenses by more than 50%.

**Plan & Strategy:** Seeking a strategic partner for technical and business collaboration.

*\*Technology funded by NIGMS and being commercialized under the NIH-CAP.*

## Product Pipeline

To demonstrate our approach we are using a modified version of the popular ruthenium BINAP catalyst. TDA is demonstrating the process by making enantiomerically pure S-Naproxen (Aleve). We are testing the process in a continuous bench-scale reactor to study the long-term stability of the catalyst and measure any catalyst losses. The apparatus is fully automated and is designed to operate unattended. The process is not limited to Naproxen and can be used to produce numerous pharmaceuticals and intermediates.

