Programmable Metallization Cell: From Academic Research to a Market Place

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Axon Technologies Corporation was founded in 1996 to develop, protect, and commercialize a platform technology known as Programmable Metallization Cell (PMC). PMC has many exciting attributes that could lead to its eventual use in fields ranging from communications to biotechnology but the initial interest was based on its application in ultra-low power solid state memory for portable consumer electronic devices such as digital cameras and MP3 players. The company business model is to operate as an intellectual property licensor, demonstrating advanced semiconductor concepts and offering technology licenses and joint development opportunities to current players in the semiconductor market.

The largest challenge faced by Axon in its first two years of existence was gaining the interest and trust of a top-tier semiconductor manufacturer, required to demonstrate that the technology was commercially viable. Small university spin-outs are rarely taken seriously by the industry, especially if they are promoting a completely new and therefore unknown technology. This challenge was met by solid laboratory results coupled with early broad-ranging patents and a large dose of tenacity and the first major license was signed in 2001 after an extended period of co-development.

The second major challenge arose from the breadth of applications that can be improved by the company's PMC platform technology. Axon's patent portfolio not only covers memory but also includes elements that could very well become critical to advanced processors in the next 5-10 years. One strategy the company pursued resulted in a close working relationship with a Silicon Valley venture-funded start-up focused on memory products, a relationship that is vital to Axon as it will not only lead to significant revenues but also further licensing opportunities. This positions the company well as a licensor of pervasive intellectual property in the semiconductor industry.

One key learning from our first 10 years of existence is that no matter how good your technology is and how many patents you have protecting it, you absolutely must have the best legal team on board. PMC memory is slated to replace existing technologies as they become less able to meet the needs of "highly-scaled" systems in a market that will soon exceed $50 billion. In a highly competitive industry like semiconductor memories, assume each of your partners is likely also a competitor and adjust your behaviors accordingly.

A major benefit of Axon's existence has been its ability to fund on-going research efforts within Arizona State University's solid state electronics laboratories. The technology had its genesis in the labs but quickly transcended the normal university research funding model so the company was formed around it via a private placement. The faculty founder has remained with the University while holding the position of CTO in the company. Axon has committed around $1.5 million in research funding to ASU to promote the development of the technology, leading to an astonishing 22 issued US patents with a similar number of issued foreign counterparts, all paid for by Axon. The University is also the recipient of a royalty stream from Axon's licensing activities, which include three issued licenses to memory manufacturers.