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COMMERCIALIZING NANOPHASE MATERIALS: *A 30-YEAR ODYSSEY*

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In 1989, with the newly developing scientific field of nanomaterials still in its infancy, it seemed like a good, if rather bold, time to create the first dedicated commercial venture to manufacture and distribute nanophase materials to the public. Not that the public was yet interested or really aware of these materials, nor were we really yet able to scale up our laboratory process for creating these materials in commercially viable quantities. We were making milligrams in our laboratory at Argonne National Laboratory and we would need tons. Nevertheless, the gas-condensation process that we were using seemed scalable, without breaking any basic physical principles, by introducing a few changes, and the joint venture capital arm of Argonne and the University of Chicago, ARCH Development Corp., was eager to co-found and fund Nanophase Technologies Corp. Over the next few years, five additional venture capital firms would join in funding the company until its going public in 1997. We were well on our way.

Over the intervening 30 years, there have been many challenges large and small, some successes, and many rewarding experiences. The first major challenge and success was scaling up manufacturing from milligrams per day to hundreds of tons per year. The next was establishing a solid long-term commercial need and customer, which became metal-oxide nanoparticles for sun protection and BASF. Over the years, a large number of potentially profitable products were sought, and a smaller number were found. They led to commercial activities in several areas: active materials for personal care, including sunscreen ingredients; fully formulated cosmetics; and advanced materials products that include architectural and industrial coatings, abrasion-resistant additives, plastics additives, medical diagnostics, and a variety of surface finishing (polishing) applications, including optics. An overview of these commercialization experiences will be presented with examples from the past 30 years, along with some of the many lessons learned.