RAY TECHNIQUES LTD.
NANODIAMOND TECHNOLOGIES

Diamond Nano-Spices for Advanced Materials

Scope
Nanodiamonds (ND) manufacturing

Target Industries
Polymers, chemicals for electronics, machinery, lubricants, energy, bio-medicine, defense, nanotechnology

Mission
- ✓ To revolutionize the process of the industrial fabrication of ND
- ✓ To be the leading supplier of ND additives of the highest quality
- ✓ To develop novel diamond nano-composites with required properties meeting requirements of industry and medicine

Management
Olga Levinson, CEO, co-founder, M.Sc. in Mechanical Eng., Business Enterprise training, business strategy, company building, R&D management
Boris Zousman, CTO, co-founder, M.Sc. in Electrical Eng., inventor of Ray technologies, TRIZ expertize
Galina Geyzersky, CFO, BA in economics & certified CPA, financial management and R&D funding
Ori Zolberg, CPO, MBA, Wharton GCP, BA in Physics, experienced executive in high-tech industry, Horizon 2020 program and fund rising

IP protection: USA patent Method and system for controlled synthesis of nanodiamonds; patent applications in EU, S. Korea, Japan and Israel; PCT positive opinion

Targeted customers: Corning, Lubrizol, BASF, Cabot, Huntsman, Saint-Gobain, Engis, Sinmat, PolyOne, Dynasol, Kraton Kuraray, Bridgestone, Repsol, 3M, etc.

Current investment needs: for the establishing ND and ND additives production starting the fabrication of ND additives to various materials for electronic & automotive industries within 8-10 months: **$ 2.5 M**

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The company. Ray Techniques Ltd (Ray) is a private Israeli company established in 2009 and engaged in the fabrication of nanodiamonds (ND) by proprietary technology and development of novel ND applications.

The problem. Currently ND powder is used in various fields such as: fine polishing, coatings, lubricants, reinforced polymers, bio-medical research, and more. This vast range of applications is defined by unique ND structure and properties. Currently, state-of-the-art NDs are produced by non-controllable, polluting & dangerous technology of TNT & RDX detonation with subsequent isolation & purification of ND by boiling in concentrated acid. High potential of ND has not been realized because of three main reasons: a variable quality, a high manufacturing cost and the absence of industrial technologies for ND disaggregation and homogeneous mixing.

Ray solution. Ray has developed a ground-breaking technology for producing NDs of the highest quality by laser treatment of ash and wax mixture. Ray's method is "green" and cost-effective. In addition, Ray has developed innovative technology for ND disaggregation and uniform distribution within diverse media, necessary for industrial fabrication of ND compounds. The Ray's product list contains: fine polishing products, anti-wear additives to lubricants, additives to coatings, thermal interface materials and suspensions for biomedical research. Furthermore, exceptionally promising results have been obtained in cancer research and slow neutrons reflection applications.

The market. Application markets are huge, however, because of the reasons described above, the ND powder market is still in its initial stage (~ $ 100 M). Potential ND additives Global Market is estimated as $ 30 B annually.

Business model. Ray plans manufacturing both raw ND and ready to use ND additives in the form of slurries and masterbatches with disaggregated particles, extensive development of new applications, patenting & licensing.

Phase 1: Establishing Manufacturing Line for Production of Advanced Nano-Diamond Additives (PANDA) to polymers, lubricants, coatings, polishes and thermal interface materials using at the beginning purchased ND powder.
Required investment: $ 2.5 M. The company can start sales within 10 months after the investing. Expected ROI: 30 months. Other ND composites (coolants, additives to fuels and batteries, various functional additives to polymers and ceramics, etc.) could be also produced at PANDA Line in future.

Phase 2: ND Manufacturing Line for industrial production of ND powder by proprietary technology. It will supply raw NDs to PANDA and research groups all over the world within 18 months after the investment receipt. Required investment: $ 1.2 M.

Current status. Ray produces ND powder and composites in laboratory terms, Ray has started initial sales of its products mainly for research needs, and is ready to establish PANDA, - feasibility study and BP writing supported by H2020 SME Instrument Phase 1 program.
Presently Ray performs R&D project Diamond Insulating Thermal Conductive Adhesives (DITCA) supported by OCS.
In collaboration with INSA University (France) and Aston University (UK) Ray participates in R&D project "Carbon nanoparticles for theranostic applications" supported by H2020 MSCA RISE program. Obtained results indicate high efficiency of ND in cancer treatment and cell imaging.
In addition, Ray is involved in R&D project in the field of national security.

Partnership. Ray is looking for strategic partners for commercialization of its technology and products. Ray also plans to cooperate with leading academic groups and potential customers in the development of new ND applications.