

The Microwave-Drill Technology – Short Executive Summary

The concept:

The microwave-drill's key principle is the energy concentration into a small hot-spot (much smaller than the microwave wavelength). The near-field microwave antenna functions also as the drill bit; it creates a localized hot-spot, penetrates into the substrate, and shapes the hole boundaries. This concept is applicable for drilling, cutting, nailing and jointing of non-metallic materials - ceramics, silicon, concrete, glasses, rocks and silicates.

Principal Investigator:

Prof. Eli Jerby, Faculty of Engineering and Ramot Ltd., Tel Aviv University, Israel.

Patents:

The microwave-drill technology is assigned to Ramot at Tel Aviv University Ltd.. Patents have been issued in the US (patent # 6,114,676) and Europe (pat.# 1,147,684), and pending in Japan and Korea.

Publications:

The invention was disclosed in *Science* Magazine - "The Microwave Drill", *Science*, Vol. 298, pp. 587-589, Oct. 18, 2002 - and reported by media channels and newspapers worldwide. Publications describing the technology are available at www.microwave-drill.com

R&D status:

The proof-of-principle was demonstrated experimentally in a variety of materials, dimensions and geometries. Several prototypes are operational now, including portable microwave drills, industrial oriented prototypes, and medical applicators.

Applications:

Industrial machines, medical devices, and professional tools - including drilling and cutting machines, jointing and pin insertion tools. The relevant industries include ceramic, concrete and glass industries; and electronics, automotive and avionic industries. Professional tools are conceived for construction, mining, and geological works. The medical applications include drilling and cutting of tissues and bones.

Advantages:

The main advantages compared to mechanical drills are the silent and clean operation. Furthermore, the microwave drill is useful for materials which are hardly drilled by conventional mechanical drills (e.g. ceramics and glasses). As compared to the laser-based drill, the microwave drill is much cheaper; its lower precision relative to laser machining is sufficient in many applications.

Commercialization:

We seek for an industrial partner / investor / entrepreneur to develop microwave-drills for specific markets. The technology-transfer could be based on a license agreement with an existing industry, or a joint start-up company with a business partner.

Contact:

Prof. Eli Jerby, Tel./Fax. +972 3 640 8048, e-mail: jerby@eng.tau.ac.il