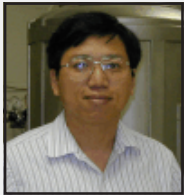


Method of Hot Filament Chemical Vapor Deposition (CVD) of Diamond

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Reference: Hot Filament CVD

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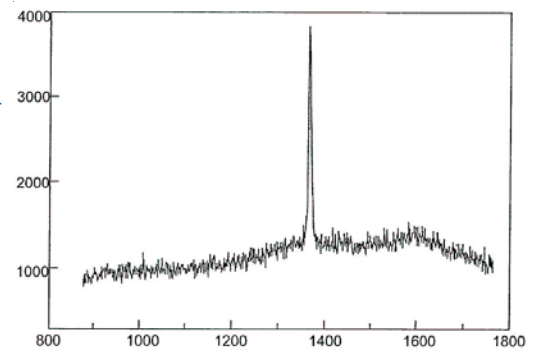


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Overview

Auburn University seeks a licensee or development partner for an invention for improved diamond synthesis via chemical vapor deposition (CVD). Our technology enables the hot filament-based growth of high quality diamond crystals and films using a liquid as the feedstock, creating a cheaper, easier, safer and more flexible process. This technology has the following industrial applications:

- Diamond coated tools for machining hard metals and materials
- IT, including wide band-gap semiconductor devices and heat spreaders for high-powered electrical devices
- Surface acoustic wave devices for microwave communications and sensors
- Optical windows
- Tri-biological coatings, electrochemical coatings and protective coatings



Raman spectrum of produced diamond film

Advantages

- Provides an inexpensive, more efficient and safer method for diamond synthesis
- Eliminates need for compressed gases by using a liquid feedstock
- Provides numerous advantages over standard compressed gas feedstocks:
 1. Reduces feedstock costs by 99 percent
 2. Eliminates the need for costly precision mass-flow controllers
 3. Reduces explosion hazards from compressed gases, improving safety
 4. Allows for continuous operation due to easier replenishment of feedstocks and reduced safety hazards, improving production rates
- Uses existing CVD methods, allowing for easy integration into current systems

Description

Diamond synthesized by chemical vapor deposition (CVD) has many unique and outstanding properties that make it suitable for a wide range of applications. The hot filament-assisted CVD is desirable because diamond films can be deposited over large areas and/or irregularly shaped objects using inexpensive equipment.

Our process provides a novel way to economically synthesize high quality diamond crystals and diamond films using a methanol-based precursor solution and a hot filament to dissociate the vaporized precursor of the premixed solution. Diamond is deposited onto the substrate by carbon containing radicals, while OH, H and O radicals preferentially etch or suppress the formation of nondiamond composites in the deposit. The use of a liquid precursor overcomes many of the problems associated with hot filament CVD, including high cost and safety issues.

Status

- United States Patent Number 6,558,742
- This invention has been successfully verified by laboratory experiment

Licensing Opportunities

- This technology is available for exclusive or non-exclusive licensing
- Joint development opportunities include funded research or a joint venture

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