

Industrial Consultancy & Sponsored Research (IC&SR)

A Spinning Disc Atomization Apparatus for Producing Micro-particles and a Method thereof

IITM Technology Available for Licensing

Problem Statement

- **Atomization** is a process of breaking a liquid solution into small droplets & then to produce micro-particles such as metal powders/alloys, wherein the types of atomization are carried out based on the type of fluid being used like centrifugal atomization & other types.
- In the conventional process, the production of micro-particles are used for mass production & the size of the micro-particles typically ≥ 100 **microns** which are fluidized & dried.
- However, the broader sized of micro-particles are **not suitable for synthesis** of micro-particles for **drug encapsulation**, wherein the requirement is **uniform sized & narrow size** distribution of micro-particles.
- This Invention provides solution of said issues.

- Further, the micro-droplets come in contact with an anti-solvent mixture in the precipitation chamber to form **solid** microparticles of **narrow size distribution**. (Refer **Figs. 3 & 4**)
- **Nitrogen gas** is supplied through connecting channels from a cylinder for drying & produce solid micro-particles.

Technology Category/ Market

Technology: Spinning disc atomization apparatus;

Industry: Food & Drug, Pharmaceutical;

Applications: Micro-particle synthesis and drug encapsulation process;

Market: The global micro-encapsulation market size is projected to be valued **\$15.5B** by **2025**, **CAGR** of **(12.9%)** during period(2022-2025).

Intellectual Property

IITM IDF Ref.:2412;

Patent Application No:202241058428

Technology

- Present invention describes a **spinning disc atomization apparatus** for producing **micro-particles**, shown in **Fig. 1 & 2**.
- Said apparatus comprises a **1st enclosure** configured to receive & dispense a feed solution, a **2nd enclosure** defines a collection area, a **base** supporting 1st & 2nd enclosures, at least one **slit** defined for each of the 1st & 2nd enclosures to **dispense a predefined volume** of micro-droplets into a precipitation chamber, including associated interlinked assemblies.

Spinning Disc Atomization Apparatus

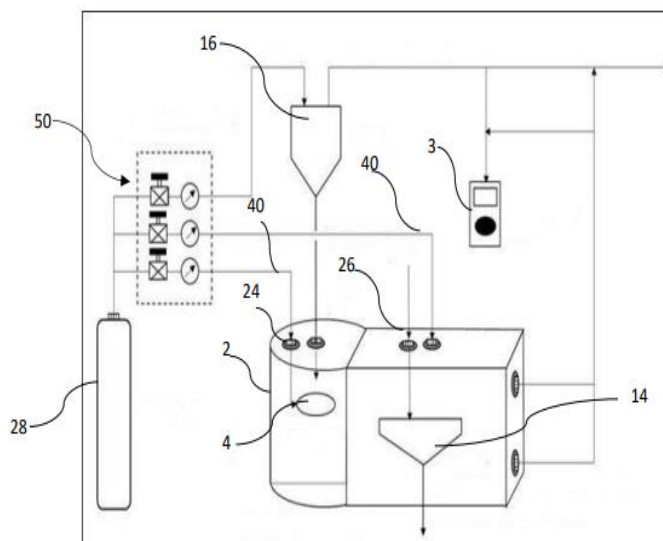


Fig.1: Illustrates Apparatus

Reference Nos listed hereinbelow:

100: Spinning disc atomization apparatus;

14: precipitation chamber; **16:** feed vessel;

40: connecting channel(s);

1,2:First & second enclosure; **4:**Rotating Disc;

26:Top cover through at least one first provision

(24); 50: pressure regulator & gauge assembly;

3: portable oxygen and hydrocarbon analyzer;

TRL (Technology Readiness Level)

TRL- 3/4, Proof of Concept & validated

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Images of Apparatus & Experimental Results

Fig.2: Illustrates perspective view of spinning disc atomization apparatus

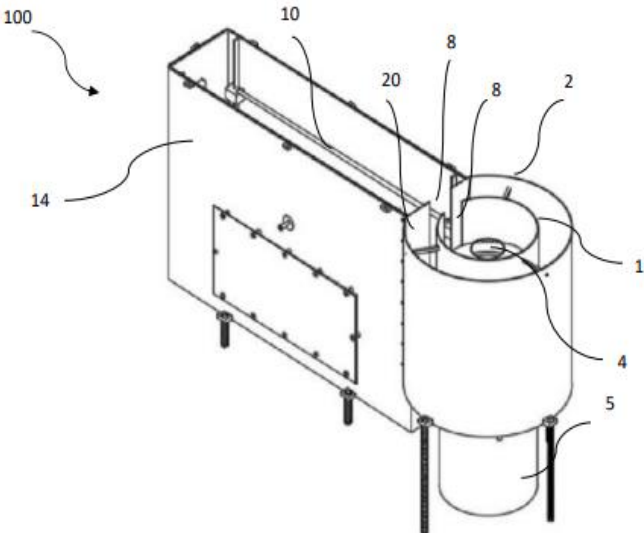


Fig.3: Illustrates the images of microparticles produced using claimed apparatus in 1 hour under scanned electron microscopy;

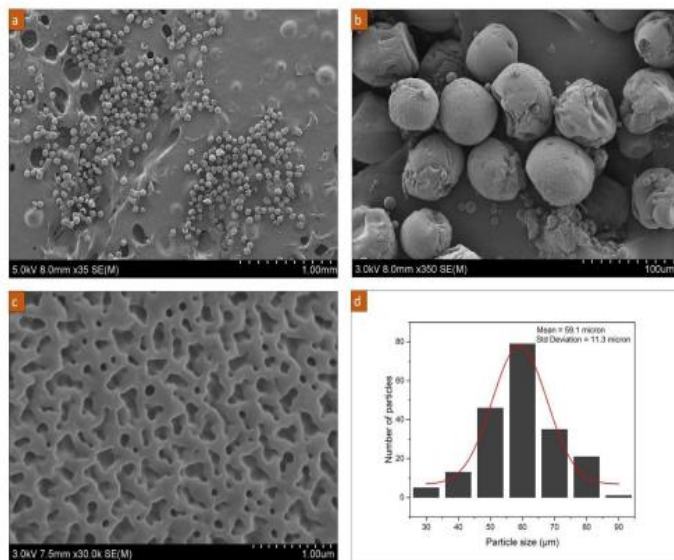


Fig. 4

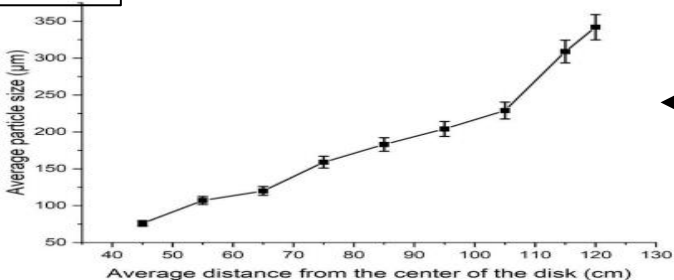


Fig. 4 (Left) illustrates the graph plotted with average particle size of sample against the average distance travelled at various disc speed from center of disk

Key Features / Value Proposition

❖ Technical Perspective:

- Proposed apparatus & method describes the operation of **production of micro-particles uniform size distribution** limited to moderate to large production rate.
- Produced micro-particles with **average sizes range ≥50 micron** used for **synthesis & drug encapsulation**.

❖ Industrial Perspective:

- Cost-effective & user-friendly** apparatus.
- Feasible to **separate the droplets** based on **size of micro-particles** in a controlled manner.

Process Flow Chart

- Introducing a feed solution disposed within 1st enclosure through a feed vessel,
- Generating micro-droplets at a periphery of the rotating disc;

- Directing the generated micro-droplets from 1st enclosure to a precipitation chamber through a slit;
- Retaining micro-droplets within 2nd enclosure & directing retained to feed vessel;

- Collecting the micro-droplets in the precipitation chamber containing anti-solvent;
- Drying the mixture collected in precipitation chamber to produce solid particles

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