

PORTABLE DIFFUSER

CLAIMS

1. An active material dispersion device comprising:
 - a) a top section, housing **one** active material dispersion engine and an active material delivery mechanism to the dispersion engine;
 - b) a middle section, featuring a sleeve for housing **one** active material reservoir container and driving electronics for the active material dispersion engine, as well as active material delivery stages, upon which the top portion can be placed and interface with the middle portion;
 - c) an active material reservoir container that contains the active material, as well as the necessary components of the active material delivery stages required for delivery of the active material to the dispersion engine;
 - d) a bottom section that encloses the middle section and thus the device, and supports the active material reservoir containers when they are attached to the device.
2. The dispersion device of claim 1, whereby a dispersing engine is mounted between the two plates of the top section and atop the last stage of the active material delivery mechanism, for which the mounts are toric rings, or O-rings, comprised of a material that has a Shore A hardness of between 45 and 55.
3. The dispersion device of claim 2, where the dispersion engine is a piezoelectric engine comprised of a porous metal mesh enclosed by a piezoelectric ceramic material, whereby a voltage can be applied to the piezoelectric ceramic material and cause the ceramic to vibrate at ultrasonic frequencies, and disperse any active material that is either in contact with or near contact to the porous metal mesh.
4. The dispersion device of claim 2, where the dispersion engine is in contact with or very near to the last stage of the active material delivery mechanism, comprising a rigid, porous, oleophilic, and hydrophilic wick made of polyethylene fibre.
5. The dispersion device of claim 2, where the bottom plate of the top section contains a ring magnet for docking with other stages of the active material delivery mechanism.
6. The dispersion device of claim 1, where the middle section of the housing contains a printed circuit board, or PCB, that features circuitry, including microprocessor, and a rechargeable lithium polymer battery to supply power to the circuitry and to the piezoelectric engine for the driving of the piezoelectric engine housed in the top section

- of the device as described in claims 2 to 5.
7. The dispersion device of claim 6, where the middle section of the housing further features a direct mechanism for user interface with the device, comprising a seven-segment display and two buttons, whereby the user can programme the dispersion device following the settings provided by the microprocessor on the PCB, as well as a USB interface for programming of the device and charging of the rechargeable lithium polymer battery detailed in claim 6.
 8. The dispersion device of claim 6, where the PCB and circuitry, including microprocessor, feature components that enable the user to interface with the device via an indirect mechanism such as Bluetooth and Wi-Fi.
 9. The dispersion device of claim 1, where an active material reservoir container is a container of a certain volume made of glass, plastic, or metal, and can be fit into the housing via a sleeve as described in claim 1.
 10. The dispersion device of claim 9, where the active material reservoir container also features components of the active material delivery mechanism, including a soft, hydrophilic, and oleophilic wick made of polyethylene, that fits into the bottle and delivers active material to the last stage of the active material delivery mechanism described in claim 4.
 11. The dispersion device of claim 10, where the active material reservoir container features a cap through which the soft, hydrophobic, and oleophilic wick can fit through and thus interface directly through contact with the last stage of the active material delivery mechanism described in claim 4.
 12. The dispersion device of claim 10, where the cap component of the active material reservoir container further features a rubber- or polymer-coated washer that interfaces with and magnetically docks to the top section of the dispersion device as described in claim 5, providing good contact with the last stage of the delivery mechanism and sealing the interface between the active material reservoir container and the docking portion of the device.
 13. The dispersion device of claim 1, where the bottom section of the device features two magnets mounted on posts that dock with two magnets attached to the bottom of the middle section of the device, thus supporting the active material reservoir container and fully enclosing the device.
 14. An active material dispersion device comprising:
 - a) a top section housing **three** active material dispersion engines, each with their own

- components for their respective active material delivery mechanisms;
- b) a middle section featuring **three** sleeves for housing active material reservoir containers, allowing for up to three active material reservoir containers to be placed within and be used by the device, as well as driving electronics for the active material dispersion engines and active material delivery stages, upon which the top portion can be placed and interfaced with;
 - c) a bottom section that encloses the middle portion and thus the device, along with any active material reservoir containers when they are attached to the device.
15. The dispersion device of claim **14**, where the top section is comprised of two plates that are connected by posts fitted through ports in the bottom plate, as well as clips that extend from the side of the top plate, and attached to the middle section via screws that are fitted through posts in the middle section, and slots for the clips.
 16. The dispersion device of claim **15**, where **three** dispersing engines are mounted between the two plates of the top section and atop the last stage of the active material delivery mechanism, whereby the mounts for each of the dispersing engines are toric rings, or O-rings, comprised of a material that has a Shore A hardness of between 45 and 55.
 17. The dispersion device of claim **15**, where the dispersion engines are identical to the dispersion engines described in claim **3**.
 18. The dispersion device of claim **15**, where the dispersion engines are in contact with or very near to the last stage of the active material delivery mechanism for each dispersion engine, comprising rigid, porous, oleophilic, and hydrophilic wicks made of polyethylene fibre.
 19. The dispersion device of claim **15**, where the bottom plate of the top section contains a ring magnet at each of the three last stage delivery mechanisms, for docking with other stages of the active material delivery mechanism.
 20. The dispersion device of claim **14**, where the middle section of the housing contains a printed circuit board, or PCB, that features circuitry, including microprocessor, and a rechargeable lithium polymer battery to supply power to the circuitry and to the piezoelectric engines for the driving of the piezoelectric engines housed in the top section of the device as described in claims **15** to **18**.
 21. The dispersion device of claim **20**, where the middle section of the housing features a direct mechanism for user interface with the device, comprising a seven-segment display and four buttons, whereby the user can programme each dispersion engine of the device following the settings provided on the microprocessor on the PCB, as well as a USB

interface for programming of the device and charging of the rechargeable lithium polymer battery detailed in claim **20**.

- 22.** The dispersion device of claim **20**, where the PCB and circuitry, including microprocessor, feature components that enable the user to interface with the device via an indirect mechanism such as Bluetooth and Wi-Fi.
- 23.** The dispersion device of claim **14**, where the bottom section of the device features one magnet mounted on a post that docks with a magnet attached to the bottom of the middle section of the device, thus supporting the active material reservoir containers placed within the device and fully enclosing the device.