CLAIMS

1. A system for managing a photovoltaic device, comprising:

a voltage switching means, including:

a first port of the voltage switching means being enabled to be coupled to a plurality of photovoltaic devices;

a second port of the voltage switching means being enabled to be coupled to a load driven by the photovoltaic devices; and

a third port of the voltage switching means being enabled to be coupled to a voltage source,

wherein the voltage switching means is adapted to operate in a first position for providing a first current path between the photovoltaic devices and the voltage source and a second position for providing a second current path between the photovoltaic devices and the load; and

wherein a voltage signal generated by the voltage source is applied to the photovoltaic devices, such that the voltage signal has a first state including one or more voltage pulses with a positive magnitude for generating an external electric field across the photovoltaic devices when the voltage switching means is in the first position, and has a second state to provide electrical isolation between the voltage source and the load when the voltage switching means is in the second position.

2. The system of claim 1, wherein the voltage switching means comprises a double throw switch.

3. The system of claim 1 or claim 2, further comprising a switch controller coupled to the voltage switching means for controlling at least one of a frequency and a duration of switching between the first position and the second position.

4. The system of any one of claims 1-3, further comprising a device adapted for mitigating any voltage drop-out of the first state, the device being coupled between the load and the photovoltaic devices.

5. The system any one of claims 1-4, wherein application of the voltage signal comprises applying an adjustable voltage to the photovoltaic devices.

6. The system of any one of claims 1-5, further comprising a control circuit coupled to at least one of the voltage source and the voltage switching means for controlling at least one of a frequency, a magnitude, and a duration of the first state and the second state, and optionally further comprising a monitoring means selected from a current sensor coupled in series between the photovoltaic devices and the load and a voltage probe coupled across the photovoltaic devices.

7. The system of any one of claims 1-6, wherein, for a selected photovoltaic device of the plurality of photovoltaic devices, application of the external electric field to across the selected photovoltaic device increases an output power and/or an output current of the selected photovoltaic device.

8. The system of claim 7, wherein the application of the external electric field to across the selected photovoltaic device increases the output power and/or the output current of the selected photovoltaic device by up to fifty percent under low light conditions.

9. The system of claim 7, wherein the application of the external electric field to across the selected photovoltaic device increases the output power and/or the output current of the selected photovoltaic device by more than fifty percent under low light conditions.

10. The system of any one of claims 7-9, wherein the application of the external electric field to across the selected photovoltaic device increases the output power and/or the output current of the selected photovoltaic device by up to twenty percent under high intensity light conditions.

11. The system of any one of claims 7-10, wherein the application of the external electric field to across the selected photovoltaic device increases the output power and/or the output current of the selected photovoltaic device between twenty percent and fifty percent.

12. The system of any one of claims 7-10, wherein the application of the external electric field to across the selected photovoltaic device increases the output power and/or the output current of the selected photovoltaic device by more than fifty percent.

13. The system of any one of claims 7-12, wherein the increase in the output power and/or an output current is based upon an intensity of light incident on the selected photovoltaic device, the voltage signal applied to the selected photovoltaic device, a thickness of the selected photovoltaic device, a pulse width of the voltage pulses, and/or a frequency of the voltage pulses.

14. A method of managing a photovoltaic device, comprising:

enabling a first port of a switch to be coupled to the photovoltaic device;

enabling a second port of the switch to be coupled to a load driven by the photovoltaic device;

enabling a third port of the switch to be coupled to a voltage source, wherein the switch can operate in a first position for providing a first current path between the photovoltaic device and the voltage source and a second position for providing a second current path between the photovoltaic device and the load; and

applying a voltage signal generated by the voltage source to the photovoltaic device when the switch is in a first position, the voltage signal having a first state including one or more voltage pulses with a positive magnitude for generating an external electric field across the photovoltaic device when the switch is in the first position, and a second

state to provide electrical isolation between the voltage source and the load when the switch is in the second position, wherein application of the external electric field to across the photovoltaic device increases an output power and/or an output current of the photovoltaic device.

15. The method of claim 14, wherein the application of the external electric field to across the photovoltaic device increases the output power and/or the output current of the photovoltaic device by up to fifty percent under low light conditions.

16. The method of claim 14, wherein the application of the external electric field to across the photovoltaic device increases the output power and/or the output current of the photovoltaic device by more than fifty percent under low light conditions.

17. The method of any one of claims 14-16, wherein the application of the external electric field to across the photovoltaic device increases the output power and/or the output current of the photovoltaic device by up to twenty percent under high intensity light conditions.

18. The method of any one of claims 14-17, wherein the application of the external electric field to across the photovoltaic device increases the output power and/or the output current of the photovoltaic device between twenty percent and fifty percent.

19. The method of any one of claims 14-17, wherein the application of the external electric field to across the photovoltaic device increases the output power and/or the output current of the photovoltaic device by more than fifty percent.

20. The method of any one of claims 14-19, wherein the increase in the output power and/or an output current is based upon an intensity of light incident on the photovoltaic device, the voltage signal applied to the photovoltaic device, a thickness of the photovoltaic device, a pulse width of the voltage pulses, and/or a frequency of the voltage pulses.

21. The system of any one of claims 1-13, wherein the voltage pulses have a uniform magnitude.

22. The system of any one of claims 1-13 and 21, wherein the plurality of photovoltaic devices is disposed in a series device configuration, a parallel device configuration or a combination thereof.

23. The system of any one of claims 1-5, 7-13, 21 and 22, further comprising a control circuit for controlling at least one of the magnitude, a duration and a frequency of the first state to maximize a power output of the photovoltaic device.

24. The system of claim 23, further comprising a measuring device for measuring an output voltage of the photovoltaic device and/or an output current of the photovoltaic device, wherein said control circuit adjusts the at least one of the magnitude, the duration and the frequency based upon the measured output voltage and/or the measured output current.

25. The system of claim 24, wherein said measuring device comprises a voltage probe coupled across the photovoltaic device and/or a current sensor coupled in series between the photovoltaic device and the load.

26. The system of any one of claims 1-13 and 21-25, wherein said voltage switching means applies the second state between adjacent first states.

27. The system of any one of claims 1-13 and 21-26, wherein said voltage switching means applies the second state between adjacent series of voltage pulses.

28. The system of claim 27, wherein said voltage switching means applies the second state between adjacent voltage pulses or applies the second state between selected adjacent voltage pulses.

29. The system of claim 4, wherein the device is configured for supplying energy to the load while the switching means is in the first position.

30. The system of claim 4 or claim 29, wherein the device is configured for storing energy generated by the photovoltaic device while the switching means is in a second position.

31. The system of any one of claims 4, 29 and 30, wherein the device comprises a capacitor, an inductor and/or a battery.

32. The system of any one of claims 1-13 and 21-31, wherein said voltage switching means applies the voltage signal to the photovoltaic devices without structural modification of the photovoltaic devices.

33. The system of any one of claims 1-13 and 21-32, wherein the first port of said voltage switching means is coupled with one or more existing electrodes of the photovoltaic devices.

34. The method of any one of claims 14-20, further comprising controlling at least one of a frequency and a duration of switching between the first position and the second position.

35. The method of any one of claims 14-20 and 34, further comprising mitigating voltage drop-out at the load while the switch is in the first position.

36. The method of claim 35, wherein said mitigating the voltage drop-out includes supplying energy to the load from an energy storage device while the switch is in the first position.

37. The method of claim 35 or claim 36, wherein said mitigating the voltage drop-out includes storing energy generated by the plurality of photovoltaic devices while the switch is in the second position.

38. The method of claim 37, wherein the generated energy is stored in an energy storage device.

39. The method of any one of claims 36-38, wherein the energy storage device comprises a capacitor, an inductor and/or a battery.

40. The method of any one of claims 14-20 and 34-39, wherein said applying the voltage signal comprises applying an adjustable voltage to the photovoltaic devices.

41. The method of any one of claims 14-20 and 34-40, further comprising controlling at least one of the magnitude, a duration and a frequency of the first state to maximize a power output of the photovoltaic device.

42. The method of claim 41, further comprising measuring an output voltage of the photovoltaic device and/or an output current of the photovoltaic device, wherein said controlling includes adjusting the at least one of the magnitude, the duration and the frequency based upon said measuring.

43. The method of any one of claims 14-20 and 34-42, wherein the voltage pulses have a uniform magnitude.

44. The method of any one of claims 14-20 and 34-43, wherein the plurality of photovoltaic devices is disposed in a series device configuration, a parallel device configuration or a combination thereof.

45. The method of any one of claims 14-20 and 34-44, wherein said applying the voltage signal includes applying the second state between adjacent first states.

46. The method of any one of claims 14-20 and 34-45, wherein said applying the voltage signal includes applying the second state between adjacent series of voltage pulses.

47. The method of claim 46, wherein said applying the voltage signal includes applying the second state between adjacent voltage pulses or applying the second state between selected adjacent voltage pulses.

48. The method of any one of claims 14-20 and 34-47, wherein said applying the voltage signal includes applying the voltage signal to the photovoltaic devices without structural modification of the photovoltaic devices.

49. The method of any one of claims 14-20 and 34-48, wherein said enabling the first port of the switch comprises enabling the first port of the switch to be coupled with one or more existing electrodes of the photovoltaic devices.