CLAIMS

1. An energy storage capacitor comprising

a first electrode,

a second electrode, and

a solid multilayer structure disposed between said first and second electrodes,

wherein said electrodes are flat and planar and positioned parallel to each other, and

wherein said solid multilayer structure comprises ***m*** insulating layers and conductive layers both parallel to the electrodes, wherein **m** is the total number of insulating layers and conductive layers,

said layers are disposed parallel to said electrodes, and

said layers have the following sequence: A-B-(A-B-…A-B-)A, where

A is a homogeneous insulating layer which comprises polyethylene

B is a homogeneous conductive layer comprising polyaniline, and

m is equal to 3 or more,

wherein insulating layer thickness (d_{ins}), conductive layer thickness (d_{cond}), number of the insulating layers (n_{ins}) ≥ 2, dielectric permittivity of the insulating layers (ε_{ins}) and dielectric permittivity of the conductive layers (ε_{cond}) satisfy the following relation:

$$d_{cond} = p \cdot (n_{ins}/(n_{ins}-1)) \cdot (\varepsilon_{cond}/\varepsilon_{ins}) \cdot d_{ins}, \text{ where } p \geq 3,$$

wherein ε_{cond} and ε_{ins} are measured at identical operational parameters.

2. The energy storage capacitor according to Claim 1, wherein the electrodes comprise Pt, Cu, Al, Ag and/or Au.

3. A method of producing an energy storage capacitor, which comprises the steps of

a) preparation of a conducting substrate serving as a first electrode,

b) formation of a multilayer structure on the first electrode, and

c) formation of a second electrode on the multilayer structure

wherein formation of the multilayer structure comprises alternating steps of application of insulating layers and application of conductive layers or a step of coextrusion of insulating and conductive layers, wherein the multilayer structure is a solid multilayer structure disposed between said first and second electrodes,

wherein said electrodes are flat and planar and positioned parallel to each other, and

wherein said solid multilayer structure comprises ***m*** insulating layers and conductive layers, wherein **m** is the total number of insulating layers and conductive layers both parallel to the electrodes,

said layers are disposed parallel to said electrodes, and

said layers have the following sequence: A-B-(A-B-…A-B-)A, where

A is a homogeneous insulating layer which comprises polyethylene,

B is a homogeneous conductive layer comprising polyaniline, and

m is equal to 3 or more

wherein insulating layer thickness (d_{ins}), conductive layer thickness (d_{cond}), number of the insulating layers (n_{ins}) ≥ 2, dielectric permittivity of the insulating layers (ε_{ins}) and dielectric permittivity of the conductive layers (ε_{cond}) satisfy the following relation:

$d_{cond} = p \cdot (n_{ins}/(n_{ins}-1) \cdot (\varepsilon_{cond}/\varepsilon_{ins}) \cdot d_{ins}$, where $p \geq 3$,

wherein ε_{cond} and ε_{ins} are measured at identical operational parameters.

4. The method according to Claim 3, wherein the step b) of formation of the multilayer structure comprises alternating steps of the application of a solution of an insulating material and the application of a solution of a conductive material, wherein both application steps are followed by a step of drying to form solid insulating layers and solid conductive layers, the alternating steps are repeated until formation of the multilayer structure is completed, and the insulating layer is formed as the first layer and as the last layer, said first layer and said last layer each being in direct contact with an electrode.

5. The method according to Claim 3, wherein the step b) of formation of the solid multilayer structure comprises a step of coextrusion of a set of alternating conductive layers and insulating layers onto the substrate, followed by drying to form the solid multilayer structure.