PATENT CLAIMS

1. Etching composition comprising an aqueous solution of at least a quaternary ammonium fluoride salt having the general formula:

$R^1R^2R^3R^4N^+F^-$

wherein

R^1	$-CHY_a-CHY_bY_c$, which consists of groups, wherein two, three or four of the nitrogen attachments form part of a ring or a ringsystem and
Y_a, Y_b, and Y_c	H, alkyl, aryl, heteroaryl,
R^2, R^3 and R^4	independently from each other equal to R^1 or alkyl, alkylammoniumfluoride, aryl, heteroaryl or $-CHY_a-CHY_bY_c$,

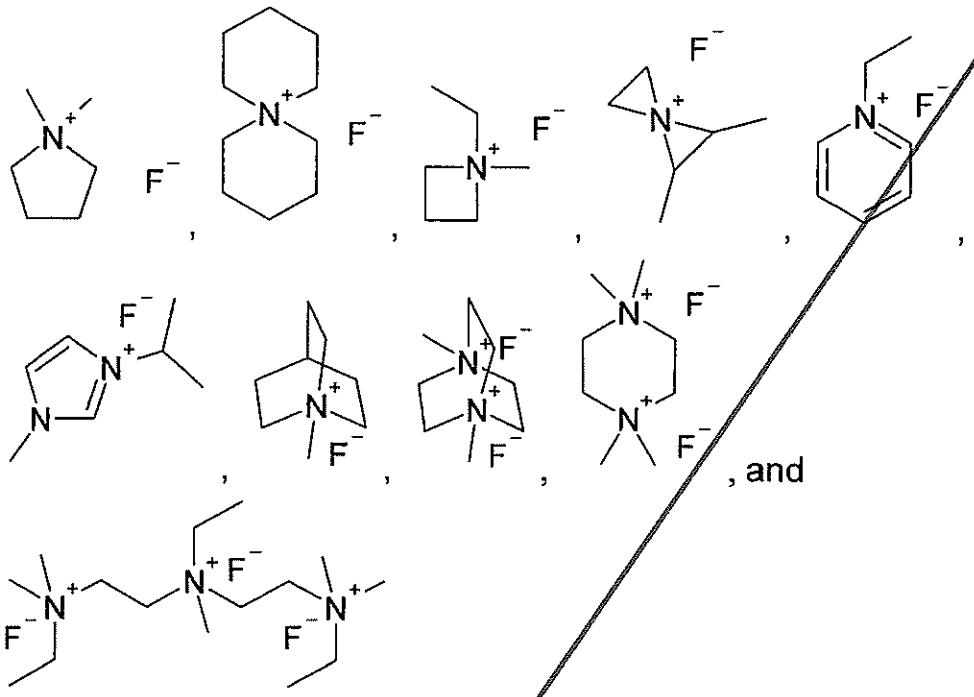
with the proviso that by elimination of H in $-CHY_a-CHY_bY_c$ volatile molecules are generated.

2. Etching composition according to claim 1 comprising a quaternary ammonium fluoride salt, wherein the nitrogen of $-CHY_a-CHY_bY_c$ forms part of a pyridium or imidazolium ring system.

3. Etching composition according to claim 1 comprising at least one tetraalkylammonium fluoride salt.

4. Etching composition according to claim 3, wherein the quaternary ammonium fluoride salt comprises at least one alkyl group being an ethyl or butyl group or a larger hydrocarbon group having up to 8 carbon atoms.

5. Etching composition according to one or more of the preceding claims 1 to 4, comprising at least one quaternary ammonium fluoride salt selected from the group $EtMe_3N^+F^-$, $Et_2Me_2N^+F^-$, $Et_3MeN^+F^-$, $Et_4N^+F^-$, $MeEtPrBuN^+F^-$, $^iPr_4N^+F^-$, $^nBu_4N^+F^-$, $^sBu_4N^+F^-$, $Pentyl_4N^+F^-$, $OctylMe_3N^+F^-$, $PhEt_3N^+F^-$, $Ph_3EtN^+F^-$, $PhMe_2EtN^+F^-$,



6. Etching composition according to one or more of the preceding claims 1 to 5, comprising at least one quaternary ammonium fluoride salt in a concentration in a rage > 20% w/w to > 80% w/w.

7. Etching composition according to one or more of the preceding claims 1 to 6, comprising at least an alcohol besides of water as solvent and optionally surface tension controlling agents.

8. Etching composition according to one or more of the preceding claims 1 to 7, comprising a solvent selected from the group of water, methanol, ethanol, n-propanol, iso-propanol, n-butanol, t-butanol, iso-butanol, sec-butanol, ethylene glycol, propylene glycol, mono- and polyhydric alcohols having higher carbon number, acetone, methyl ethyl ketone (MEK), methyl n-amyl ketone (MAK) or mixtures thereof.

9. Etching composition according to one or more of the preceding claims 1 to 5, which is a printable 'hot melt' material composed of pure salts, and which are fluidized by heating.

10. Etching composition according to one or more of the preceding claims 1 to 9, comprising an etchant, which is activated at temperatures in the range of 50 to 300 °C, preferably in the range of 70 to 300 °C, and which is printable at a temperature in the range of room temperature to 150 °C.

11. Etching composition according to one or more of the preceding claims 1 to 10, showing no or very low etching capability during storage and printing.

12. Method for the etching of inorganic layers in the production of photovoltaic or semiconducting devices comprising the steps of
a) contactless application of an etching composition according to one or more of the claims 1 to 11 onto the surface to be etched, and
b) heating the applied etching composition to generate or activate the active etchant and etching the exposed surface areas of functional layers.

13. Method of claim 12 comprising the steps of
a) contactless application of an etching composition by printing or coating, whereby the etching composition is heated to a temperature in the range of room temperature to 100 °C, preferably to a temperature in the range of room temperature up to 70°C,
and
b) heating the applied etching composition to a temperature in the range of 70 to 300 °C to generate or activate the active etchant and etching the exposed surface areas of functional layers.

14. Method according to claim 12 or 13, characterized in that the etching composition is heated to a temperature in the range of room temperature to 70 °C and applied by
spin or dip coating, drop casting, curtain or slot dye coating, screen or flexo printing, gravure or ink jet aerosol jet printing, offset printing, micro contact printing, electrohydrodynamic dispensing,

roller or spray coating, ultrasonic spray coating, pipe jetting, laser transfer printing, pad or off-set printing.

15. Method according to claims 12, 13 or 14, wherein the heated etching composition is applied to etch functional layers or layer stacks consisting of Silicon oxide (SiO_x), Silicon nitride (SiN_x), Silicon oxy nitrides ($Si_xO_yN_z$), Aluminium oxide (AlO_x), Titanium oxide (TiO_x) and amorphous silicon (a-Si).

16. Semiconductiing device or photovoltaic device produced by carrying out a method according to claims 12, 13, 14 or 15.

CLAIMS

1. An invention not claimed in any divisional application.