Patent Claims

1. Process for the production of a component, comprising the following steps:

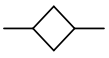
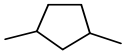
(1) provision of a substrate having a substrate surface,
(2) application of a solution comprising one or more compounds of the formula I to the substrate surface,
(3) heating of the substrate to a temperature in the range from 60°C to 300°C,

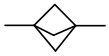
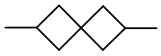
where formula I is defined as follows:

$$R^1\text{-}(A^1\text{-}Z^1)_r\text{-}(B^1)_n\text{-}(Z^2\text{-}A^2)_s\text{-}Sp\text{-}G \qquad (I)$$

in which

R^1 denotes H, an alkyl or alkoxy radical having 1 to 15 C atoms, where, in addition, one or more CH_2 groups in these radicals may each be replaced, independently of one another,

by -C≡C- , -CH=CH-,  ,  ,  ,

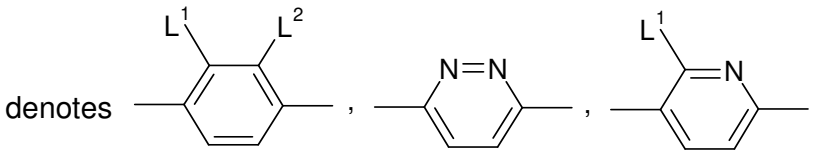
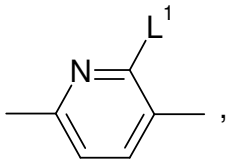
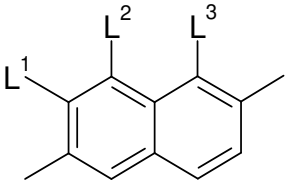
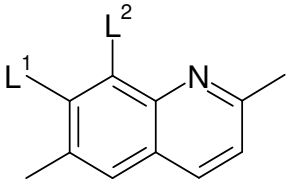
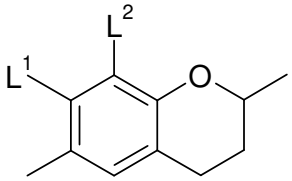
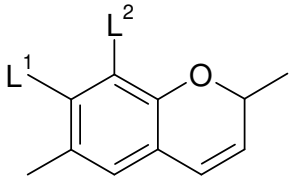
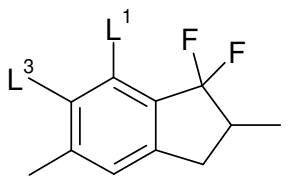
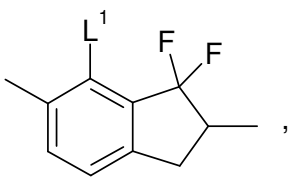
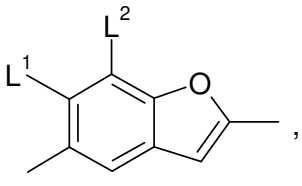
  , -O-, -S-, -CF_2O-, -OCF_2-, -CO-O-

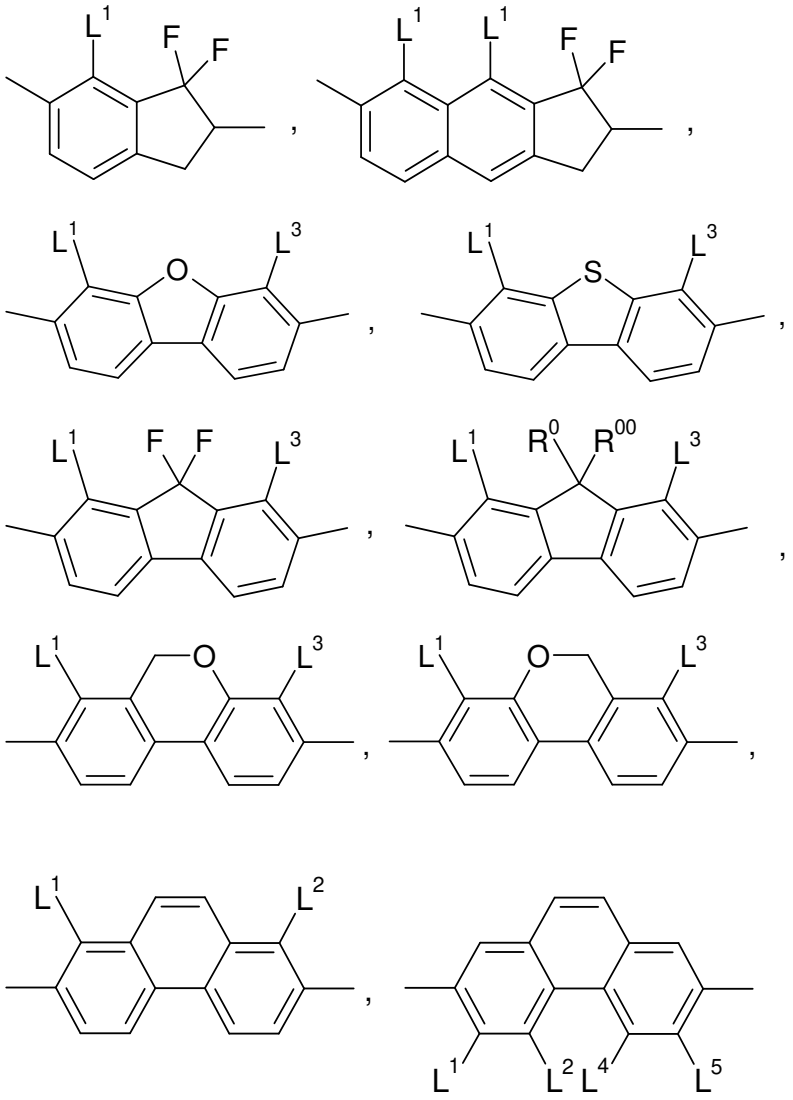
, -O-CO- , -SiR^0R^{00}- , -NH- ,-NR^0- or -SO_2- in such a way that O atoms are not linked directly to one another, and in which, in addition, one or more H atoms may be replaced by halogen, CN, SCN or SF_5,

R^0, R^{00} denote, identically or differently, an alkyl or alkoxy radical having 1 to 15 C atoms, in which, in addition, one or more H atoms may be replaced by halogen,

A^1, A^2 on each occurrence, identically or differently, denote an aromatic, heteroaromatic, alicyclic or heteroaliphatic ring having 4 to 25 ring atoms, which may also contain condensed rings and which may be mono- or polysubstituted by Y,

Y on each occurrence, identically or differently, denotes F, Cl, CN, SCN, SF_5 or straight-chain or branched, in each case optionally fluorinated, alkyl, alkoxy, alkylcarbonyl, alkoxycarbonyl, alkylcarbonyloxy or alkoxycarbonyloxy having 1 to 12 C atoms,

B^1 denotes , , , , , , , , , , 



where the groups may be oriented in both directions,

L^1 to L^5 denote, independently of one another, F, Cl, Br, I, CN, SF_5, CF_3 or OCF_3, preferably Cl or F, where L^3 alternatively may also denote H,

Z^1, Z^2 on each occurrence, identically or differently, denote a single bond, $-CF_2O-$, $-OCF_2-$, $-CF_2S-$, $-SCF_2-$, $-CH_2O-$, $-OCH_2-$, $-C(O)O-$, $-OC(O)-$, $-C(O)S-$, $-SC(O)-$, $-CH_2-$, $-(CH_2)_2-$, $-(CH_2)_3-$, $-(CH_2)_4-$, $-CF_2-$, $-CF_2-CF_2-$

, $-CF_2-CH_2-$, $-CH_2-CF_2-$, -CH=CH-, -CF=CF- , -CF=CH-, -CH=CF-, $-(CH_2)_3O-$, $-O(CH_2)_3-$, -C≡C-, -O-, -S-, -C=N-, -N=C-, -N=N-, -N=N(O)-, -N(O)=N- or -N=C-C=N-,

Sp denotes a spacer group or a single bond,

G denotes $-SO_2OR^V$, $-OP(O)(OR^V)_2$, $-PO(OR^V)_2$, $-C(OH)(PO(OR^V)_2)_2$, $-COOR^V$ or $-Si(OR^V)_3$,

R^V denotes secondary or tertiary alkyl having 3 to 20 C atoms,

r and s, independently of one another, denote 0, 1, 2 or 3,

where $r + s \leq 4$, and

n denotes 0 or 1.

2. Process according to Claim 1, where the substrate consists of a material selected from glass, metal oxide, metal nitride, metal oxynitride, element semiconductors, group III-V compound semiconductors, group II-VI compound semiconductors, metals, and conductive, oxidic materials.

3. Process according to Claim 1 or 2, where the substrate consists of a material selected from the element semiconductors Si, Ge, C, Sn, and Se, the compound semiconductors GaAs, InAs, InP, GaSb, TaN, TiN, MoN, WN and GaN, CdSe and ZnS, the metals Au, Ag, Cu, Al, W, Ta, Ti, Co, Mo, Pt, Ru and Mg, the conductive oxidic materials ITO, IGO, IGZO, AZO and FTO, or glass, SiO_2, Al_2O_3, TiO_2, HfO_2, ZrO_2 Si_3N_4, TaN_x, TiN_x TiN_xO_y or TaN_xO_y.

4. Process according to one or more of Claims 1 to 3, where the substrate surface has a coating consisting of a different material from the substrate.

5. Process according to Claim 4, where the coating of the substrate surface consists of an oxide and/or nitride of one or more metals or semi-metals.

6. Process according to one or more of Claims 1 to 5, where the solvent is removed by means of a stream of inert gas after application of the solution to a substrate.

7. Process according to one or more of Claims 1 to 6, where at least one of the steps is carried out at a pressure below 1000 hPa.

8. Process according to one or more of Claims 1 to 7, where the application of the solution to a substrate is carried out by spin coating.

9. Process for the production of a component, characterised in that the production is carried out by deposition of one or more compounds of the formula I according to Claim 1 from the gas phase.

10. Process according to Claim 9, where the deposition is carried out at a pressure of less than 500 hPa.

11. Process according to one or more of Claims 1 to 10, where n in formula I, as defined in Claim 1, denotes 1.

12. Component for use in an electronic element containing a self-assembled monolayer, formed and set up for the adoption of two switching states, where the component has been produced by the process according to one or more of Claims 1 to 11, with the proviso

that the self-assembled monolayer has been produced using one or more compounds of the formula IA,
where formula IA is defined as follows:

$$R^1\text{-}(A^1\text{-}Z^1)_r\text{-}B^1\text{-}(Z^2\text{-}A^2)_s\text{-}Sp\text{-}G \qquad (IA)$$

where the groups and parameters occurring have the meanings indicated in Claim 1.

13. Component according to Claim 12, where the one or more compounds of the formula IA are selected from the compounds of the formulae

$R^1\text{-}B^1\text{-}Sp\text{-}G$	IAa
$R^1\text{-}(A^1\text{-}Z^1)\text{-}B^1\text{-}Sp\text{-}G$	IAb
$R^1\text{-}(A^1\text{-}Z^1)_2\text{-}B^1\text{-}Sp\text{-}G$	IAc
$R^1\text{-}B^1\text{-}(Z^2\text{-}A^2)\text{-}Sp\text{-}G$	IAd
$R^1\text{-}B^1\text{-}(Z^2\text{-}A^2)_2\text{-}Sp\text{-}G$	IAe
$R^1\text{-}(A^1\text{-}Z^1)\text{-}B^1\text{-}(Z^2\text{-}A^2\text{-})\text{-}Sp\text{-}G$	IAf

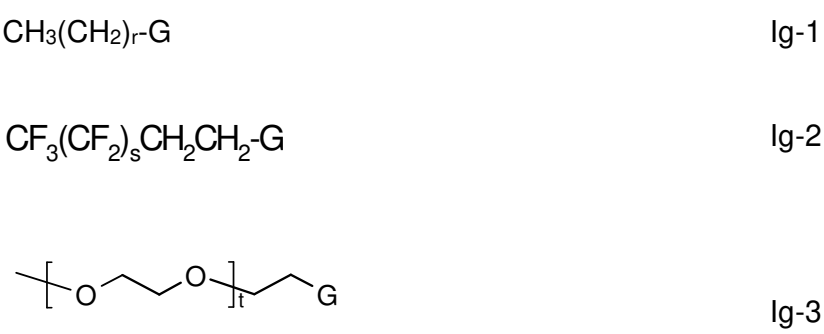
in which R^1, A^1, A^2, B^1, Z^1, Z^2, Sp and G have the meanings indicated in Claim 1.

14. Component according to Claim 12 or 13, where the material for the production of the self-assembled monolayer additionally comprises one or more compounds of the formula Ig

$$R^2\text{-}G \qquad Ig$$

in which R^2 has the meaning indicated for R^1 in Claim 1 and G has the meaning indicated in Claim 1.

15. Component according to Claim 14, where the one or more compounds of the formula Ig are selected from the compounds of the formulae Ig-1 to Ig-3



Ig-1

Ig-2

Ig-3

in which

G denotes $-PO(OR^V)_2$ or $-SO_2OR^V$,

R^V denotes secondary or tertiary alkyl having 3 to 20 C atoms,

r denotes an integer from 1 to 14,

s denotes an integer from 1 to 12, and

t denotes an integer from 1 to 4.

16. Use of the component according to one or more of Claims 12 to 15 in a memristive electronic switching element.

17. Compound of the formula IA

R^1-(A^1-Z^1)$_r$-B^1-(Z^2-A^2)$_s$-Sp-G (IA)

in which the groups and parameters occurring have the meanings indicated in Claim 1.

18. Compound of the formula IA according to Claim 17, in which

G denotes -SO_2OR^V or -$PO(OR^V)_2$, and

R^V denotes an isopropyl or tert-butyl radical.