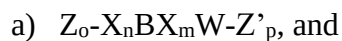


Claim

1. A peptide capable of forming a gel by self-assembly, said peptide having a general formula selected from:



wherein Z is an N-terminal protecting group and Z' is a C-terminal protecting group, with o and p being independently selected from 0 and 1;

wherein X is, independently at each occurrence, an aliphatic amino acid selected from isoleucine, norleucine, leucine, valine, alanine, glycine, homoallylglycine and homopropargylglycine with n and m being integers being independently selected from 0, 1 and 2, with the proviso that $m+n \leq 2$,

wherein B is an aromatic amino acid selected from phenylalanine and tryptophan, or is an aliphatic counterpart of said aromatic amino acid, said aliphatic counterpart being selected from cyclohexylalanine, 4-hydroxy-cyclohexylalanine, 3,4-dihydroxycyclohexylalanine.

Wherein W is a polar amino acid selected from aspartic acid, glutamic acid, asparagine, glutamine, lysine, 5-N-ethyl-glutamine (theanine), citrulline, thio-citrulline, cysteine, homocysteine, methionine, ethionine, selenomethionine, telluromethionine, threonine, allothreonine, serine, homoserine, tyrosine, histidine, arginine, homoarginine, ornithine, lysine, N(6)-carboxymethyllysine, histidine, 2,4-diaminobutyric acid (Dab), 2,3-diaminopropionic acid (Dap), and N(6)-carboxymethyllysine,

wherein said polar amino acid is preferably selected from the group consisting of aspartic acid, asparagine, glutamic acid, glutamine, serine, threonine, methionine, arginine, histidine, lysine, ornithine (Orn), 2,4-diaminobutyric acid (Dab), and 2,3-diaminopropionic acid (Dap).

2. The peptide according to claim 1, wherein o and p are each 1.

3. The peptide according to any of claims 1-2, wherein Z has the general formula $-C(O)-R$, wherein R is selected from the group consisting of H, unsubstituted or substituted alkyls, and unsubstituted or substituted aryls, wherein R is preferably selected from the group consisting of methyl, ethyl, propyl, isopropyl, butyl and isobutyl, and wherein Z' is $-NR_1R_2$, R_1 and R_2 being independently selected from H and C_1-C_{10} alkyl, said- NR_1R_2 thus forming an amide group at the C-terminus of said peptide, wherein preferably Z is an acetyl group, and wherein preferably Z' is NH_2 .

4. The peptide according to any of the foregoing claims, wherein said amino acids in said peptide are either L-amino acids or D-amino acids.

5. The peptide according to any of the foregoing claims, wherein each of the hydrophilic amino acids has a polar group which is independently selected from a hydroxyl, an ether, a carboxyl, an imido, an amido, an ester, an amino, a guanidine, a thio, a thioether, a seleno and a telluro group.

6. The peptide according to any of the foregoing claims, wherein said gel is a hydrogel or is an organogel.

7. The peptide according to any of the foregoing claims, wherein the peptide consists of a sequence selected from

IVFK (SEQ ID NO:1)

IVOK (SEQ ID NO:2)

IFVK (SEQ ID NO:3)

IOVK (SEQ ID NO:4)

FIVK (SEQ ID NO:5)

OIVK (SEQ ID NO:6)

FVIK (SEQ ID NO:7)

OVIK (SEQ ID NO:8)

IVFD (SEQ ID NO:9)

IVOD	(SEQ ID NO:10)
IFVD	(SEQ ID NO:11)
IOVD	(SEQ ID NO:12)
FIVD	(SEQ ID NO:13)
OIVD	(SEQ ID NO:14)
FVID	(SEQ ID NO:15)
OVID	(SEQ ID NO:16)

IVFE	(SEQ ID NO:17)
IVOE	(SEQ ID NO:18)
IFVE	(SEQ ID NO:19)
IOVE	(SEQ ID NO:20)
FIVE	(SEQ ID NO:21)
OIVE	(SEQ ID NO:22)
FVIE	(SEQ ID NO:23)
OVIE	(SEQ ID NO:24)

IVFS	(SEQ ID NO:25)
IVOS	(SEQ ID NO:26)
IFVS	(SEQ ID NO:27)
IOVS	(SEQ ID NO:28)
FIVS	(SEQ ID NO:29)
OIVS	(SEQ ID NO:30)
FVIS	(SEQ ID NO:31)
OVIS	(SEQ ID NO:32)

IVFR	(SEQ ID NO:33)
IVOR	(SEQ ID NO:34)
IFVR	(SEQ ID NO:35)
IOVR	(SEQ ID NO:36)
FIVR	(SEQ ID NO:37)
OIVR	(SEQ ID NO:38)
FVIR	(SEQ ID NO:39)
OVIR	(SEQ ID NO:40)

IVF(Dab)	(SEQ ID NO:41)
IVO(Dab)	(SEQ ID NO:42)
IFV(Dab)	(SEQ ID NO:43)
IOV(Dab)	(SEQ ID NO:44)
FIV(Dab)	(SEQ ID NO:45)
OIV(Dab)	(SEQ ID NO:46)
FVI(Dab)	(SEQ ID NO:47)
OVI(Dab)	(SEQ ID NO:48)

IVF(Dap)	(SEQ ID NO:49)
IVO(Dap)	(SEQ ID NO:50)
IFV(Dap)	(SEQ ID NO:51)
IOV(Dap)	(SEQ ID NO:52)
FIV(Dap)	(SEQ ID NO:53)
OIV(Dap)	(SEQ ID NO:54)
FVI(Dap)	(SEQ ID NO:55)
OVI(Dap)	(SEQ ID NO:56)

IVF(Orn)	(SEQ ID NO:57)
IVO(Orn)	(SEQ ID NO:58)
IFV(Orn)	(SEQ ID NO:59)
IOV(Orn)	(SEQ ID NO:60)
FIV(Orn)	(SEQ ID NO:61)
OIV(Orn)	(SEQ ID NO:62)
FVI(Orn)	(SEQ ID NO:63)
OVI(Orn)	(SEQ ID NO:64)

KFVI	(SEQ ID NO:65)
KOVI	(SEQ ID NO:66)
KVFI	(SEQ ID NO:67)
KVOI	(SEQ ID NO:68)
KVIF	(SEQ ID NO:69)
KVIO	(SEQ ID NO:70)

KIVF	(SEQ ID NO:71)
KIVO	(SEQ ID NO:72)
DFVI	(SEQ ID NO:73)
DOVI	(SEQ ID NO:74)
DVFI	(SEQ ID NO:75)
DVOI	(SEQ ID NO:76)
DVIF	(SEQ ID NO:77)
DVIO	(SEQ ID NO:78)
DIVF	(SEQ ID NO:79)
DIVO	(SEQ ID NO:80)
EFVI	(SEQ ID NO:81)
EOVI	(SEQ ID NO:82)
EVFI	(SEQ ID NO:83)
EVOI	(SEQ ID NO:84)
EVIF	(SEQ ID NO:85)
EVIO	(SEQ ID NO:86)
EIVF	(SEQ ID NO:87)
EIVO	(SEQ ID NO:88)
SFVI	(SEQ ID NO:89)
SOVI	(SEQ ID NO:90)
SVFI	(SEQ ID NO:91)
SVOI	(SEQ ID NO:92)
SVIF	(SEQ ID NO:93)
SVIO	(SEQ ID NO:94)
SIVF	(SEQ ID NO:95)
SIVO	(SEQ ID NO:96)
RFVI	(SEQ ID NO:97)
ROVI	(SEQ ID NO:98)
RVFI	(SEQ ID NO:99)
RVOI	(SEQ ID NO:100)

RVIF	(SEQ ID NO:101)
RVIO	(SEQ ID NO:102)
RIVF	(SEQ ID NO:103)
RIVO	(SEQ ID NO:104)

(Dab)FVI	(SEQ ID NO:105)
(Dab)OVI	(SEQ ID NO:106)
(Dab)VFI	(SEQ ID NO:107)
(Dab)VOI	(SEQ ID NO:108)
(Dab)VIF	(SEQ ID NO:109)
(Dab)VIO	(SEQ ID NO:110)
(Dab)IVF	(SEQ ID NO:111)
(Dab)IVO	(SEQ ID NO:112)

(Dap)FVI	(SEQ ID NO:113)
(Dap)OVI	(SEQ ID NO:114)
(Dap)VFI	(SEQ ID NO:115)
(Dap)VOI	(SEQ ID NO:116)
(Dap)VIF	(SEQ ID NO:117)
(Dap)VIO	(SEQ ID NO:118)
(Dap)IVF	(SEQ ID NO:119)
(Dap)IVO	(SEQ ID NO:120)

(Orn)FVI	(SEQ ID NO:121)
(Orn)OVI	(SEQ ID NO:122)
(Orn)VFI	(SEQ ID NO:123)
(Orn)VOI	(SEQ ID NO:124)
(Orn)VIF	(SEQ ID NO:125)
(Orn)VIO	(SEQ ID NO:126)
(Orn)IVF	(SEQ ID NO:127)
(Orn)IVO	(SEQ ID NO:128)

wherein I = isoleucine, L = leucine, V = valine, F = phenylalanine, K = lysine, D = aspartic acid, O = cyclohexylalanine, (Dab) = 2,4-diaminobutyric acid, (Dap) = 2,3-diaminopropionic acid, and (Orn) = ornithine;

wherein each of the sequences may be protected or unprotected at the N-terminus, preferably acetylated or non—acetylated, and may be amidated or non-amidated at the C-terminus, wherein, preferably, said sequence is selected from

Ac-IVFK-NH₂ (SEQ ID NO:1)

Ac-IVOK-NH₂ (SEQ ID NO:2)

Ac-IFVK-NH₂ (SEQ ID NO:3)

Ac-IOVK-NH₂ (SEQ ID NO:4)

Ac-FIVK-NH₂ (SEQ ID NO:5)

Ac-OIVK-NH₂ (SEQ ID NO:6)

Ac-FVIK-NH₂ (SEQ ID NO:7)

Ac-OVIK-NH₂ (SEQ ID NO:8)

Ac-IVFD-COOH (SEQ ID NO:9)

Ac-IVOD-COOH (SEQ ID NO:10)

Ac-IFVD-COOH (SEQ ID NO:11)

Ac-IOVD-COOH (SEQ ID NO:12)

Ac-FIVD-COOH (SEQ ID NO:13)

Ac-OIVD-COOH (SEQ ID NO:14)

Ac-FVID-COOH (SEQ ID NO:15)

Ac-OVID-COOH (SEQ ID NO:16)

Ac-IVFE-COOH (SEQ ID NO:17)

Ac-IVOE-COOH (SEQ ID NO:18)

Ac-IFVE-COOH (SEQ ID NO:19)

Ac-IOVE-COOH (SEQ ID NO:20)

Ac-FIVE-COOH (SEQ ID NO:21)

Ac-OIVE-COOH (SEQ ID NO:22)

Ac-FVIE-COOH (SEQ ID NO:23)

Ac-OVIE-COOH (SEQ ID NO:24)

Ac-IVFS- –NH ₂	(SEQ ID NO:25)
Ac-IVOS- –NH ₂	(SEQ ID NO:26)
Ac-IFVS- –NH ₂	(SEQ ID NO:27)
Ac-IOVS- –NH ₂	(SEQ ID NO:28)
Ac-FIVS- –NH ₂	(SEQ ID NO:29)
Ac-OIVS- –NH ₂	(SEQ ID NO:30)
Ac-FVIS- –NH ₂	(SEQ ID NO:31)
Ac-OVIS- –NH ₂	(SEQ ID NO:32)

Ac-IVFR-NH ₂	(SEQ ID NO:33)
Ac-IVOR-NH ₂	(SEQ ID NO:34)
Ac-IFVR-NH ₂	(SEQ ID NO:35)
Ac-IOVR-NH ₂	(SEQ ID NO:36)
Ac-FIVR-NH ₂	(SEQ ID NO:37)
Ac-OIVR-NH ₂	(SEQ ID NO:38)
Ac-FVIR-NH ₂	(SEQ ID NO:39)
Ac-OVIR-NH ₂	(SEQ ID NO:40)

Ac-IVF(Dab)–NH ₂	(SEQ ID NO:41)
Ac-IVO(Dab) –NH ₂	(SEQ ID NO:42)
Ac-IFV(Dab)-NH ₂	(SEQ ID NO:43)
Ac-IOV(Dab) –NH ₂	(SEQ ID NO:44)
Ac-FIV(Dab) –NH ₂	(SEQ ID NO:45)
Ac-OIV(Dab) -NH ₂	(SEQ ID NO:46)
Ac-FVI(Dab) –NH ₂	(SEQ ID NO:47)
Ac-OVI(Dab) -NH ₂	(SEQ ID NO:48)

Ac-IVF(Dap) –NH ₂	(SEQ ID NO:49)
Ac-IVO(Dap) -NH ₂	(SEQ ID NO:50)
Ac-IFV(Dap) -NH ₂	(SEQ ID NO:51)
Ac-IOV(Dap) -NH ₂	(SEQ ID NO:52)
Ac-FIV(Dap) -NH ₂	(SEQ ID NO:53)
Ac-OIV(Dap) -NH ₂	(SEQ ID NO:54)
Ac-FVI(Dap) –NH ₂	(SEQ ID NO:55)

Ac-OVI(Dap) -NH₂ (SEQ ID NO:56)

Ac-IVF(Orn) –NH₂ (SEQ ID NO:57)

Ac-IVO(Orn) –NH₂ (SEQ ID NO:58)

Ac-IFV(Orn) –NH₂ (SEQ ID NO:59)

Ac-IOV(Orn) -NH₂ (SEQ ID NO:60)

Ac-FIV(Orn) -NH₂ (SEQ ID NO:61)

Ac-OIV(Orn) –NH₂ (SEQ ID NO:62)

Ac-FVI(Orn) –NH₂ (SEQ ID NO:63)

Ac-OVI(Orn) -NH₂ (SEQ ID NO:64)

Ac-KFVI-NH₂ (SEQ ID NO:65)

Ac-KOVI-NH₂ (SEQ ID NO:66)

Ac-KVFI-NH₂ (SEQ ID NO:67)

Ac-KVOI-NH₂ (SEQ ID NO:68)

Ac-KVIF-NH₂ (SEQ ID NO:69)

Ac-KVIO-NH₂ (SEQ ID NO:70)

Ac-KIVF-NH₂ (SEQ ID NO:71)

Ac-KIVO-NH₂ (SEQ ID NO:72)

Ac-DFVI-NH₂ (SEQ ID NO:73)

Ac-DOVI-NH₂ (SEQ ID NO:74)

Ac-DVFI-NH₂ (SEQ ID NO:75)

Ac-DVOI-NH₂ (SEQ ID NO:76)

Ac-DVIF-NH₂ (SEQ ID NO:77)

Ac-DVIO-NH₂ (SEQ ID NO:78)

Ac-DIVF-NH₂ (SEQ ID NO:79)

Ac-DIVO-NH₂ (SEQ ID NO:80)

Ac-EFVI-NH₂ (SEQ ID NO:81)

Ac-EOVI-NH₂ (SEQ ID NO:82)

Ac-EVFI-NH₂ (SEQ ID NO:83)

Ac-EVOI-NH₂ (SEQ ID NO:84)

Ac-EVIF-NH₂ (SEQ ID NO:85)

Ac-EVIO-NH ₂	(SEQ ID NO:86)
Ac-EIVF-NH ₂	(SEQ ID NO:87)
Ac-EIVO-NH ₂	(SEQ ID NO:88)
Ac-SFVI-NH ₂	(SEQ ID NO:89)
Ac-SOVI-NH ₂	(SEQ ID NO:90)
Ac-SVFI-NH ₂	(SEQ ID NO:91)
Ac-SVOI-NH ₂	(SEQ ID NO:92)
Ac-SVIF-NH ₂	(SEQ ID NO:93)
Ac-SVIO-NH ₂	(SEQ ID NO:94)
Ac-SIVF-NH ₂	(SEQ ID NO:95)
Ac-SIVO-NH ₂	(SEQ ID NO:96)
Ac-RFVI-NH ₂	(SEQ ID NO:97)
Ac-ROVI-NH ₂	(SEQ ID NO:98)
Ac-RVFI-NH ₂	(SEQ ID NO:99)
Ac-RVOI-NH ₂	(SEQ ID NO:100)
Ac-RVIF-NH ₂	(SEQ ID NO:101)
Ac-RVIO-NH ₂	(SEQ ID NO:102)
Ac-RIVF-NH ₂	(SEQ ID NO:103)
Ac-RIVO-NH ₂	(SEQ ID NO:104)
Ac-(Dab)FVI –NH ₂	(SEQ ID NO:105)
Ac- (Dab)OVI -NH ₂	(SEQ ID NO:106)
Ac- (Dab)VFI –NH ₂	(SEQ ID NO:107)
Ac- (Dab)VOI –NH ₂	(SEQ ID NO:108)
Ac- (Dab)VIF -NH ₂	(SEQ ID NO:109)
Ac- (Dab)VIO -NH ₂	(SEQ ID NO:110)
Ac- (Dab)IVF –NH ₂	(SEQ ID NO:111)
Ac- (Dab)IVO –NH ₂	(SEQ ID NO:112)
Ac-(Dap)FVI –NH ₂	(SEQ ID NO:113)
Ac-(Dap)OVI -NH ₂	(SEQ ID NO:114)
Ac-(Dap)VFI -NH ₂	(SEQ ID NO:115)

Ac-(Dap)VOI -NH ₂	(SEQ ID NO:116)
Ac-(Dap)VIF -NH ₂	(SEQ ID NO:117)
Ac-(Dap)VIO -NH ₂	(SEQ ID NO:118)
Ac-(Dap)IVF -NH ₂	(SEQ ID NO:119)
Ac-(Dap)IVO -NH ₂	(SEQ ID NO:120)
Ac-(Orn)FVI -NH ₂	(SEQ ID NO:121)
Ac-(Orn)OVI -NH ₂	(SEQ ID NO:122)
Ac-(Orn)VFI -NH ₂	(SEQ ID NO:123)
Ac-(Orn)VOI -NH ₂	(SEQ ID NO:124)
Ac-(Orn)VIF -NH ₂	(SEQ ID NO:125)
Ac-(Orn)VIO -NH ₂	(SEQ ID NO:126)
Ac-(Orn)IVF -NH ₂	(SEQ ID NO:127)
Ac-(Orn)IVO -NH ₂	(SEQ ID NO:128)

wherein Ac = acetyl acetylates the N-terminus, NH₂ = amine, thus amidates the C-terminus, and -COOH = unprotected C-terminus.

8. The peptide according to any of the foregoing claims, wherein said N-terminal protecting group Z is a peptidomimetic molecule, including natural and synthetic amino acid derivatives, wherein the N-terminus of said peptidomimetic molecule may be modified with a functional group selected from the group consisting of carboxylic acid, amide, alcohol, aldehyde, amine, imine, nitrile, an urea analog, phosphate, carbonate, sulfate, nitrate, maleimide, vinyl sulfone, azide, alkyne, alkene, carbohydrate, imide, peroxide, ester, aryl, ketone, sulphite, nitrite, phosphonate, and silane.

9. The peptide according to any of the foregoing claims, wherein said C-terminal group Z' is selected from the group of small molecules, functional groups and linkers.

10. The peptide according to claim 9, wherein said C-terminal group Z' is selected from
 - functional groups, such as polar or non-polar functional groups,
 such as (but not limited to)

-COOH, -COOR, -COR, -CONHR or -CONRR' with R and R' being selected from the group consisting of H, unsubstituted or substituted alkyls, and unsubstituted or substituted aryls,

-NH₂, -OH, -SH, -CHO, maleimide, imidoester, carbodiimide ester, isocyanate;

- small molecules,

such as (but not limited to) sugars, alcohols, hydroxy acids, amino acids, vitamins, biotin;

- linkers terminating in a polar functional group,

such as (but not limited to) ethylenediamine, PEG, carbodiimide ester, imidoester;

- linkers coupled to small molecules or vitamins,

such as biotin, sugars, hydroxy acids.

11. The peptide according to claim 9 or 10, wherein said C-terminal group Z' is suitable to be used for chemical conjugation or coupling of at least one compound selected from

bioactive molecules or moieties,

such as growth factors, cytokines, lipids, cell receptor ligands, hormones, prodrugs, drugs, vitamins, antigens, antibodies, antibody fragments, oligonucleotides (including but not limited to DNA, messenger RNA, short hairpin RNA, small interfering RNA, microRNA, peptide nucleic acids, aptamers), saccharides;

label(s), dye(s),

such as fluorescent or radioactive label(s), imaging contrast agents;

pathogens,

such as viruses, bacteria and parasites;

micro- and nanoparticles

or combinations thereof

wherein said chemical conjugation can be carried out before or after self-assembly of the peptide.

12. The peptide according to any of the foregoing claims, wherein the C-terminus of the peptide is functionalized, such as by chemical conjugation or coupling of at least one compound selected from

bioactive molecules or moieties,

such as growth factors, cytokines, lipids, cell receptor ligands, hormones, prodrugs, drugs, vitamins, antigens, antibodies, antibody fragments, oligonucleotides (including but not limited to DNA, messenger RNA, short hairpin RNA, small interfering RNA, microRNA, peptide nucleic acids, aptamers), saccharides;

label(s), dye(s),

such as fluorescent or radioactive label(s), imaging contrast agents;

pathogens,

such as viruses, bacteria and parasites;

micro- and nanoparticles

or combinations thereof

wherein said chemical conjugation can be carried out before or after self-assembly of the peptide and/or peptidomimetic.

13. The peptide according to any of the foregoing claims, wherein said C-terminal group Z' is a peptidomimetic molecule, including natural and synthetic amino acid derivatives, wherein the C-terminus of said peptidomimetic molecule may be modified with a functional group selected from the group consisting of carboxylic acid, amide, alcohol, aldehyde, amine, imine, nitrile, an urea analog, phosphate, carbonate, sulfate, nitrate, maleimide, vinyl sulfone, azide, alkyne, alkene, carbohydrate, imide, peroxide, ester, aryl, ketone, sulphite, nitrite, phosphonate, and silane.

14. The peptide according to any of the foregoing claims, being stable in aqueous solution at physiological conditions at ambient temperature for a period of time in the range from 1 day to at least 6 months, preferably to at least 8 months more preferably to at least 12 months.

15. The peptide according to any of the foregoing claims, being stable in aqueous solution at physiological conditions, at a temperature up to 90 °C, for at least 1 hour.

16. A hydrogel or organogel comprising the peptide of any one of claims 1 to 15.

17. The hydrogel or organogel according to claim 16, wherein the hydrogel is stable in aqueous solution at ambient temperature for a period of at least 1 month, preferably at least 2 to 4 months, more preferably at least 6 to 12 months.
18. The hydrogel or organogel according to claim 16 or 17, wherein the hydrogel is characterized by a storage modulus G' to loss modulus G'' ratio that is greater than 2 to 5.
19. The hydrogel or organogel according to any one of claims 16 to 18, wherein the hydrogel or organogel is characterized by a storage modulus G' from 500Pa to 200,000 Pa at a frequency in the range of from 0.1 Hz to 100 Hz.
20. The hydrogel or organogel according to any one of claims 16 to 19, wherein the hydrogel or organogel has a higher mechanical strength than collagen or its hydrolyzed form (gelatin).
21. The hydrogel or organogel according to any one of claims 16 to 20, comprising fibers of the peptide of any one of claims 1 to 15, said fibers defining a network that is capable of entrapping at least one of a microorganism, a virus particle, a peptide, a peptoid, a protein, a nucleic acid, an oligosaccharide, a polysaccharide, a vitamin, an inorganic molecule, a synthetic polymer, a micro-or nanoparticle, a small organic molecule or a pharmaceutically active compound.
22. The hydrogel or organogel according to claim 21, wherein the hydrogel comprises at least one of a microorganism, a virus particle, a peptide, a peptoid, a protein, a nucleic acid, an oligosaccharide, a polysaccharide, a vitamin, an inorganic molecule, a synthetic polymer, a small organic molecule, a micro-or nanoparticle, or a pharmaceutically active compound entrapped by the network of fibers.
23. The hydrogel or organogel according to claim 22, wherein the fibers are coupled to the at least one of a microorganism, a virus particle, a peptide, a peptoid, a protein, a nucleic acid, an oligosaccharide, a polysaccharide, a vitamin, an inorganic molecule, a synthetic polymer, a small organic molecule, a micro-or nanoparticle, or a pharmaceutically active compound entrapped by the network of fibers.

24. The hydrogel or organogel according to any one of claims 17 to 23, wherein the hydrogel or organogel is comprised in at least one of a fuel cell, a solar cell, an electronic cell, a biosensing device, a medical device, an implant, a pharmaceutical composition and a cosmetic composition.
25. The hydrogel or organogel according to any of claims 16 to 24, which is injectable.
26. Use of the peptide according to any of claims 1 – 15 or of the hydrogel or organogel according to any one of claims 16 to 25 in at least one of the following:
- medical tool kit,
 - a fuel cell,
 - a solar cell,
 - an electronic cell,
 - regenerative medicine and tissue regeneration,
 - implantable scaffold
 - disease model
 - wound healing,
 - 2D and 3D synthetic cell culture substrate,
 - stem cell therapy,
 - injectable therapies,
 - biosensor development,
 - high-throughput screening,
 - biofunctionalized surfaces,
 - printing
 - biofabrication, such as bio-printing, and
 - gene therapy.
27. A method of preparing a hydrogel or organogel, the method comprising dissolving a peptide according to any one of claims 1 to 15 in an aqueous solution or an organic solution, respectively.
28. The method of claim 27, wherein the dissolved peptide in aqueous or organic solution is further exposed to temperature, wherein the temperature is in the range from 20 °C to 90 °C, preferably from 20 °C to 70 °C.

29. The method of claim 27 or 28, wherein the peptide is dissolved at a concentration from 0.01 µg/ml to 100 mg/ml, preferably at a concentration from 1 mg/ml to 50 mg/ml, more preferably at a concentration from about 1 mg/ml to about 20 mg/ml.
30. A cell or tissue graft or device comprising a hydrogel or organogel of any of claims of 16 to 25.
31. A wound dressing or wound healing agent comprising a hydrogel or organogel of any one of claims 16 to 25.
32. A surgical implant, or stent, the surgical implant or stent comprising a peptide scaffold, wherein the peptide scaffold is formed by a hydrogel or organogel according to any one of claims 16 to 25.
33. A pharmaceutical and/or cosmetic composition and/or a biomedical device and/or electronic device and/or a solution comprising the peptide of any one of claims 1 to 15.
34. The pharmaceutical and/or cosmetic composition and/or the biomedical device, and/or the electronic device and/or the solution of claim 33, further comprising a pharmaceutically active compound.
35. The pharmaceutical or cosmetic composition or solution of any of claims 33 to 34, wherein the pharmaceutical and/or cosmetic composition and/or solution is provided in the form of a topical gel or cream, a spray, a powder, or a sheet, patch or membrane, or wherein the pharmaceutical and/or cosmetic composition and/or solution is provided in the form of an injectable solution.
36. The pharmaceutical and/or cosmetic composition and/or solution of any one of claims 33 to 35, further comprising a pharmaceutically acceptable carrier.
37. A kit of parts, the kit comprising a first container with a peptide according to any one of claims 1 to 15 and a second container with an aqueous or organic solution.

38. The kit of parts of claim 37, wherein the aqueous or organic solution of the second container further comprises a pharmaceutically active compound.

and/or wherein the first container with a peptide further comprises a pharmaceutically active compound.

39. Use of a hydrogel or organogel as defined in any of claims 16 to 25, which is applied *in vitro* or *in vivo* by steps comprising:

(a) exposing said hydrogel or organogel to cells which are to form regenerated tissue,

(b) allowing said cells to grow on said hydrogel or organogel,

in the manufacture of a medicament for the treatment of medical conditions requiring tissue regeneration.

40. Use of a hydrogel or organogel of claim 39, which is performed *in vivo*, by providing the hydrogel or organogel at a place in a body where tissue regeneration is intended, or preferably by injecting said hydrogel or organogel at a place in the body where tissue regeneration is intended, in the manufacture of a medicament for the treatment of medical conditions requiring tissue regeneration.

41. Use of an effective amount of hydrogel or organogel of any one of claims 16 to 25 or a pharmaceutical composition of any one of claims 33 to 36 in the manufacture of a medicament for the treatment of a wound.

42. A bioimaging device comprising a hydrogel or organogel of any one of claims 16 to 25 for *in vitro* and/or *in vivo* use, preferably for oral application, for injection and/or for topical application.

43. A 2D or 3D cell culture substrate comprising a hydrogel or organogel of any one of claims 16 to 25.