CLAIMS:

1. A method for screening an encoded chemical library, which library comprises a number *n* of clonal populations of different chemical structures each releasably linked to an encoding tag by a cleavable linker via a bead, and each clonal population being confined to *n* discrete library microcompartments, the method comprising the steps of: (a) providing said library of tagged chemical structures; (b) placing each of the library microcompartments into discrete screening microdroplets, which microdroplets comprise a gelling system; (c) releasing each chemical structure from its tag to produce a plurality of free, tagless chemical structures (TCSs); (d) phenotypically screening the TCSs by contacting them with an assay system comprising a live target cell under conditions whereby a spatial association between each TCS and its tag is maintained, to produce a plurality of different screened TCSs each spatially associated with its tag; and (e) identifying a screened TCS by decoding a tag that is spatially associated therewith, wherein the gelling system of the microdroplets is gelled prior to the identifying step (e) such that the library microcompartment becomes fixed within the gelled microdroplet.

2. The method of claim 1 wherein the encoding tag comprises a nucleic acid, the method being for screening a nucleic acid-encoded chemical library.

3. The method of any one of the preceding claims, wherein the chemical structures are releasably linked to the encoding tag by a cleavable linker, optionally wherein the cleavable linker comprises a linker selected from: enzymatically cleavable linkers; nucleophile/base-sensitive linkers; reduction sensitive linkers; photocleavable linkers; electrophile/acid-sensitive linkers; metal-assisted cleavage-sensitive linkers; oxidation-sensitive linkers; and combinations of two or more of the foregoing.

4. The method of any one of the preceding claims, wherein the chemical structures are releasably linked to the encoding tag by a self-immolative linker comprising a peptide or non-peptide enzymatically cleavable moiety and a cleavage moiety and a self-immolative moiety (SIM).

5. The method of any one of the preceding claims, wherein a single bead is loaded with a plurality of chemical structures, for example such that the ratio of encoding tag(s) to linked chemical structures is 1:10 to 1:1000.

6. The method of any one of the preceding claims wherein the tags of step (d) are functionally or physically partitioned from the assay system.

7. The method of any one of claims 2-6, wherein the encoding nucleic acid tag is a template for the chemical structure.

8. The method of claim 7, wherein step (a) comprises the step of nucleic acid-templated, for example DNA-templated, synthesis of the chemical structures.

9. The method of any one of claims 1-8, wherein the library comprises a clonal population of chemical structures and step (a) comprises the step of releasably linking an encoding tag to each of the chemical structures within said clonal population.

10. Use of an encoded chemical library for use in a method of any one of the preceding claims, which library comprises a number *n* of clonal populations of chemical structures each releasably linked to an encoding tag, each clonal population being confined to *n* discrete library microcompartments.

11. Use according to claim 10 wherein the chemical structures are linked to the encoding tags by a cleavable linker as defined in claim 4.

12. Use according to claim 10 or claim 11, wherein the chemical structures are contained within the microcompartments together with encoding tags but are not covalently linked to the encoding tags.

13. Use of an assay composition in a method of any one of claims 1-9 comprising the library of any one of claims 10-12 in which the chemical structures contained within the microcompartments are in contact with an assay system.

14. Use of a nucleic encoded chemical library reactor in a method of any one of claims 1-9 comprising a microcompartment containing: (a) a clonal population of encoding nucleic acid template molecules; and (b) a plurality of chemical substructures, wherein the substructures are adapted for nucleic acid-templated assembly to form encoding nucleic-

acid-tagged chemical structures in which the encoding tags are releasably linked to the chemical structures.