

Claims

- 5 1. A structured packing element (12) for a column (10) for mass transfer
and/or heat exchange between a heavy and a light fluid phase, wherein the
structured packing element (12) comprises at least two layers (32, 32') of a
grid (38) comprising openings (40), which are surrounded and separated
10 from each other by separating elements (42), wherein at least two of the at
least two layers (32, 32') are arranged in the longitudinal direction parallel
and in touching contact with each other so that an open space (30)
extending from one end to the opposite end of the at least two layers (32,
32') is provided between them so that at least one of the heavy and the light
15 fluid phase may flow through it, wherein the average width (b) of at least
50% of the separating elements (42) between adjacent openings (40) is at
least 15 times the layer material thickness (s) and is between 70% and
125% of the average hydraulic diameter (d) of the adjacent openings (40),
and wherein the maximum distance (D) between at least two of the at least
20 two layers (32, 32') measured in the plane being perpendicular of the
longitudinal direction is at least 4 times larger than the average width (b) of
the separating elements (42), wherein the average width (b) of a separating
element (42) is determined by dividing up the separating element (42) into
individual sections $i=1, 2, 3 \dots n$ each having a section length d_i , wherein for
25 each of the sections the shortest distance b_i between the adjacent edges
within the sections is measured and the sum of the products $d_i \cdot b_i$ is divided
by the sum of d_i to yield the average width b of the separating element (42)
and wherein the layer material thickness (s) is the thickness of the material
of the layer (32, 32'), wherein the layer material thickness (s) is measured at
30 one of the outer edges of the layer (32, 32') by means of a micrometer
screw.

2. The structured packing element (12) according to claim 1, wherein the average width (b) of at least 75%, more preferably of at least 80%, still more preferably of at least 90%, yet more preferably of at least 95% and most preferably of all separating elements (42) between adjacent openings (40) is between 70% and 125% and preferably 75% to 100% of the average hydraulic diameter (d) of the adjacent openings (40).
3. The structured packing element (12) according to claim 1 or 2, wherein the average width (b) of at least 50%, preferably of at least 75%, more preferably of at least 80%, still more preferably of at least 90%, yet more preferably of at least 95% and most preferably of all separating elements (42) between adjacent openings (40) is 1.5 to 4 mm, preferably 1.6 to 3.5 mm and most preferably 1.8 to 3.0 mm.
4. The structured packing element (12) according to any of the preceding claims, wherein the maximum distance (D) between at least 50%, preferably between at least 75%, more preferably between at least 80%, still more preferably between at least 90%, yet more preferably between at least 95% and most preferably between all of the at least two layers (32, 32') measured in the plane being perpendicular of the longitudinal direction is 4 to 15 times, preferably 5 to 13 times and most preferably 8 to 12 times larger than the average width (b) of the separating elements (42).
5. The structured packing element (12) according to any of the preceding claims, wherein for at least 50%, preferably for at least 75%, more preferably for at least 80%, still more preferably for at least 90% and yet more preferably for at least 95% of the at least two layers (32, 32') the ratio of the total area of the openings (40) divided by the sheet area (As) of the

layer (32, 32') is between 20% and 38%, preferably between 25% and 35% and most preferably between 28% and 32%.

- 5 6. The structured packing element (12) according to claim 5, wherein for each of the at least two layers (32, 32') the ratio of the total area of the openings (40) divided by the sheet area (A_s) of the layer (32) is between 20% and 38%, preferably between 25% and 35% and most preferably between 28% and 32%.
- 10 7. The structured packing element (12) according to any of the preceding claims, wherein at least 50%, preferably at least 75%, more preferably at least 80%, still more preferably at least 90%, yet more preferably at least 95% and most preferably all of the openings (40) of each of the at least two layers (32, 32') have a hydraulic diameter d , which is between 50 and 150%, preferably between 70 and 130%, more preferably between 80 and 120% and most preferably between 90 and 110% of the average hydraulic diameter (d) of all openings (40).
- 15 8. The structured packing element (12) according to any of the preceding claims, wherein the hydraulic diameter (d) of at least 50%, preferably of at least 75%, more preferably of at least 80%, still more preferably of at least 90%, yet more preferably of at least 95% and most preferably of all of the openings (40) of each of the at least two layers (32, 32') is 1.25 to 5 mm, preferably 2 to 4 mm and more preferably 2.2 to 3.5 mm.
- 20 9. The structured packing element (12) according to any of the preceding claims, wherein at least 50%, preferably at least 75%, more preferably at least 80%, still more preferably at least 90%, yet more preferably at least 95% and most preferably all of the openings (40) have a rectangular or quadrilateral cross-section, wherein the shorter characteristic lengths (e_2) of
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- the rectangles or quadrangles are 1 to 4 mm and preferably 2 to 3 mm, wherein the longer characteristic lengths (e_1) of the rectangles or quadrangles are 2 to 8 mm, preferably 2.5 to 7 mm and most preferably 3 to 6 mm and wherein the average width (b) of the separating elements (42) between adjacent rectangles is 1.5 to 4 mm, preferably 1.6 to 3.5 mm and most preferably 1.8 to 3.0 mm.
10. The structured packing element (12) according to any of the preceding claims, wherein at least 50%, preferably at least 75%, more preferably at least 80%, still more preferably at least 90%, yet more preferably at least 95% and most preferably all of the openings (40) have a rectangular or quadrilateral cross-section, wherein the ratio of the shorter characteristic lengths (e_2) of the rectangles or quadrangles divided by the longer characteristic lengths (e_1) of the rectangles or quadrangles is 0.4 to 0.7, preferably 0.45 to 0.6 mm and most preferably 0.49 to 0.55 mm.
11. The structured packing element (12) according to any of the preceding claims, wherein the maximum distance (D) between each of the at least two layers (32, 32') measured in the plane being perpendicular of the longitudinal direction is at most 15 times larger than the average hydraulic diameter (d) of the openings (40).
12. The structured packing element (12) according to any of the preceding claims, wherein at least 50%, preferably at least 75%, more preferably at least 80%, still more preferably at least 90%, yet more preferably at least 95% and most preferably all of the at least two layers (32, 32') comprise periodic deformations (26, 28, 34), wherein the open space (30) between the at least two layers (32, 32') is defined by the periodic deformations (26, 28, 34).

13. The structured packing element (12) according to claim 12, wherein the periodic deformations (26, 28, 34) are corrugations comprising a plurality of alternately oriented peaks (26) and valleys (28), wherein the peaks (26) of a layer (32, 32') contact the valleys of an adjacent layer (32, 32') and the valleys (28) of a layer (32, 32') contact the peaks of an adjacent layer (32, 32'), wherein adjacent layers (32, 32') are oriented such that the peaks (26) and valleys (28) of the adjacent layers (32, 32') intersect in crisscross fashion with the peaks (26) and valleys (28) of the layers (32, 32') extending obliquely relative to the longitudinal direction (V).
14. Mass transfer column comprising at least one structured packing element (12) according to any of the preceding claims.
15. Use of a structured packing element (12) according to any of claims 1 to 14 for the mass transfer and/or heat exchange.