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(12) **United States Patent**
Griffiths et al.

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(54) **METHOD AND APPARATUS FOR
REDUCING SAMPLE DISPERSION IN
TURNS AND JUNCTIONS OF
MICROCHANNEL SYSTEMS**

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(*) Notice: Subject to any disclaimer, the term of this
patent is extended or adjusted under 35
U.S.C. 154(b) by 305 days.

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This patent is subject to a terminal dis-
claimer.

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(57) **ABSTRACT**

Related U.S. Application Data

(63) Continuation of application No. 09/299,269, filed on Apr.
26, 1999, now Pat. No. 6,270,641.

(51) **Int. Cl.**⁷ **B01L 3/02**; G01N 30/02;
G01N 21/00; G01N 27/453; B01J 19/00

(52) **U.S. Cl.** **422/100**; 422/70; 422/129;
422/50; 422/81; 204/601

(58) **Field of Search** 422/70, 99, 100,
422/129, 50, 81; 204/400, 451, 600, 601

What is disclosed pertains to improvement in the perfor-
mance of microchannel devices by providing turns, wyes,
tees, and other junctions that produce little dispersion of a
sample as it traverses the turn or junction. The reduced
dispersion results from contraction and expansion regions
that reduce the cross-sectional area over some portion of the
turn or junction. By carefully designing the geometries of
these regions, sample dispersion in turns and junctions is
reduced to levels comparable to the effects of ordinary
diffusion. The low dispersion features are particularly suited
for microfluidic devices and systems using either electro-
motive force, pressure, or combinations thereof as the prin-
ciple of fluid transport. Such microfluidic devices and sys-
tems are useful for separation of components, sample
transport, reaction, mixing, dilution or synthesis, or combi-
nations thereof.

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11 Claims, 10 Drawing Sheets

Microfiche Appendix Included
(1 Microfiche, 88 Pages)

