lar to the lengthwise direction of the channel **49** functions to drive the material toward the shallow side of the channel **49**. As can be appreciated, smaller sized materials will be driven farther into the shallow end of the channel **49** before interfering with the steps of the gradient, which facilitates variably confining and manipulating the materials for the purpose of analysis. In this example, the materials are electrokinetically-driven through the channel; however, in other examples, the materials may be hydrodynamically-driven, or the like.

[0032] The elongated channel **49** and electric field **60** may be used for many different purposes. As an example, the elongated channel **49** may be used for the separation and characterization of nanomaterials, such as nanoparticles, biomolecules, or the like, via the injection of an analyte into the channel such that nanomaterials in the analyte are driven down the channel and across the width of the channel into the shallow side. The steps of the gradient of the channel exclude rigid nanoparticles by size within spatially separate regions of the channel. A size distribution of the nanoparticles may then be determined using fluorescence microscopy of other applicable technique. Biomolecules or other flexible nanomaterials may enter the shallow side of the channel and then be transported, concentrated, separated, and organized by the complex nanoscale confinement resulting from the plurality of nanoscale critical dimensions of the channel.

[0033] Although a combination of features is shown in the illustrated examples, not all of them need to be combined to realize the benefits of various embodiments of this disclosure. In other words, a system designed according to an embodiment of this disclosure will not necessarily include all of the features shown in any one of the Figures or all of the portions schematically shown in the Figures. Moreover, selected features of one example embodiment may be combined with selected features of other example embodiments.

[0034] The preceding description is exemplary rather than limiting in nature. Variations and modifications to the disclosed examples may become apparent to those skilled in the art that do not necessarily depart from the essence of this disclosure. The scope of legal protection given to this disclosure can only be determined by studying the following claims.

What is claimed is:

1. A nanodevice comprising:

a substrate including an elongated channel having a plurality of nanoscale critical dimensions arranged as a stepped gradient across a width of the elongated channel.

2. The nanodevice as recited in claim **1**, further comprising first and second voltage control channels within the substrate, with the elongated channel being located between the first and second voltage control channels, and the first and second voltage control channels are configured to generate an electric field in the elongated channel along a direction that is varied between perpendicular and parallel to the length of the elongated channel.

3. The nanodevice as recited in claim **1**, wherein the plurality of nanoscale critical dimensions is heights of steps of the stepped gradient, and the step heights are less than 100 nanometers.

4. The nanodevice as recited in claim **1**, wherein the stepped gradient includes at least two different depths.

5. The nanodevice as recited in claim **1**, wherein the stepped gradient includes at least 1,000 different depths.

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