A. 3.9 mJ/cm^2
B. 3.2 mJ/cm^2
C. 2.4 mJ/cm^2
D. 3.2 mJ/cm^2
E. 6.8 mJ/cm^2
F. 3.9 mJ/cm^2
G. 3.9 mJ/cm^2
H. 2.4 mJ/cm^2
I. 5.3 mJ/cm^2
J. 2.4 mJ/cm^2

[0207] A formulation containing a terpolymer similar to that described in this example and base I. described above was exposed, developed and tested in a similar fashion to that described in Example 9 and showed an improvement in resolution.

Example 8

[0208] Example 7 was repeated with the following exceptions: The following solution was prepared and magnetically stirred:

Component	Wt. (gm)
NB—Me—F—OH/NB—Me—F—O—Ac-tBu copolymer (68/32, as analyzed by ^{19}F NMR) similar to that described in Example 5	6.607
2-Heptanone	46.983
6.82% (wt) solution of triphenylsulfonium nonaflate dissolved in 2-heptanone which had been filtered through a 0.45μ PTFE syringe filter.	3.410

[0209] To ten 5.0 gm samples of the above solution were added 0.128 gm of a 0.0232 M solution of one of each of the bases disclosed in Example 7 dissolved in 2-heptanone, and stirred overnight.

[0210] Wafers were coated and prepared as described in Example 7 except that exposure time was 3 seconds instead of 10 seconds, providing an unattenuated dose of 4.0 mJ/cm^2.

[0211] This test generated positive images, with the following clearing doses (mJ/cm^2) required for the formulations with the above bases:

A. 2.4 mJ/cm^2
B. 1.2 mJ/cm^2
C. 1.0 mJ/cm^2
D. 1.2 mJ/cm^2
E. 2.1 mJ/cm^2
F. 2.1 mJ/cm^2
G. 1.2 mJ/cm^2
H. 1.2 mJ/cm^2
I. 2.4 mJ/cm^2
J. 2.4 mJ/cm^2

Example A

[0212] The following solution was prepared, magnetically stirred overnight, and filtered through a 0.45μ PTFE syringe filter before use:

Component	Wt. (gm)
NB—Me—F—OH/NB—Me—F—O-tBuAc (68/32) copolymer prepared similarly to that in Example 5	1.739
2-Heptanone	12.364
6.82% (wt) solution of triphenylsulfonium nonaflate dissolved in cyclohexanone which had been filtered through a 0.45μ PTFE syringe filter.	0.897

[0213] This resist formulation was spin cast on an 8 inch Si wafer at a speed of 2000 rpm, yielding a film of measured thickness 2169 Å after PAB at 120° C. for 60 sec.

[0214] All imaging and open frame exposures were made using an Exitech 157 nm microstepper. Resist formulations were spin-coated on 8 inch Si wafers which were first vapor primed at 90° C. with hexamethyldisilazane (HMDS). The resulting films were soft baked, or post-apply baked (PAB), at 120° C. for 60 sec, and then their thicknesses were measured using a Prometrix interferometer which utilized Cauchy coefficients determined by variable angle spectroscopic ellipsometry measurements using a J.A. Woollam VU301 variable angle spectroscopic ellipsometer. After open frame exposure on the Exitech stepper (typically 100 exposure doses were made), or imaging using either a binary mask with numerical aperture (N.A.)=0.6 and partial coherence (σ)=0.7, or a Levenson strong phase shift mask with N.A.=0.6 and σ=0.3, the wafer was post-exposure baked (PEB) at 100° C. for 60 sec followed by a 60 sec puddle develop with Shipley LDD-26W 2.38% tetramethyl ammonium hydroxide. The open frame exposed wafers were then subjected to thickness measurements on the Prometrix interferometer in order to determine the thickness loss versus exposure dose, and the imaged wafers were examined using a JEOL 7550 top-down and tilt scanning electron microscope (SEM), and in some cases cross-sections were made and examined using a Hitachi 4500 SEM.

[0215] At an exposure dose of 24 mJ/cm^2 the image was found to exhibit features at 140 nm resolution.

Example 9B

[0216] The same polymer formulation was used, but with the addition of 38 microliters of 0.5 wt % tetrabutylammonium lactate (TBALac) base to 1 milliliter of the resist. This corresponds to a molar concentration of the base equal to 10% of the molar concentration of the PAG. This formulation was spin cast on an 8 inch Si wafer at 2000 rpm, yielding after PAB at 120° C. for 60 sec a film of thickness 2087 Å. This film was exposed and developed as described above. The resulting image was then examined in the JEOL 7550 SEM and was observed to exhibit features at least as small as 60 nm at an exposure dose of 52 mJ/cm^2. These features were also examined in cross-section using the Hitachi 4500 SEM, and 100 nm 1:2 lines and spaces were well resolved and exhibited good line profiles, as did 60 nm 1:5 lines and spaces. These results demonstrate that this vinyl addition polymer can image at sub-100 nm resolution, with film thcknesses exceeding 200 nm, when formulated with added base.