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(54) **Title:** COMPOSITION AND METHOD FOR MAKING PICOCRYSTALLINE ARTIFICIAL BORANE ATOMS

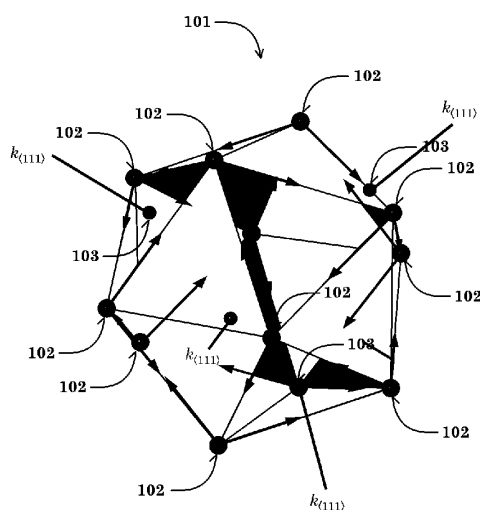


FIG. 9

(57) **Abstract:** Materials containing picocrystalline quantum dots that form artificial atoms are disclosed. The picocrystalline quantum dots (in the form of boron icosahedra with a nearly-symmetrical nuclear configuration) can replace corner silicon atoms in a structure that demonstrates both short range and long-range order as determined by x-ray diffraction of actual samples. A novel class of boron-rich compositions that self-assemble from boron, silicon, hydrogen and, optionally, oxygen is also disclosed. The preferred stoichiometric range for the compositions is $(B_{12}H_w)_x Si_y O_z$ with $3 \leq w \leq 5$, $2 \leq x \leq 4$, $2 \leq y \leq 5$ and $0 \leq z \leq 3$. By varying oxygen content and the presence or absence of a significant impurity such as gold, unique electrical devices can be constructed that improve upon and are compatible with current semiconductor technology.

