BANG™ polymer gels have recently been developed for NMR and/or optical CT imaging of dose distributions in radiation therapy [1,2]. In irradiated BANG™ gels, monomers are polymerized and the NMR relaxation rates and the optical absorbance increase in proportion to radiation dose. The sensitivity of the polymer gels described so far has allowed for measuring typical therapeutic doses on the order of 10 Gy. These gels were composed of a gelling matrix such as gelatin, of one type of linear monomer (such as acrylamide or acrylic acid), one crosslinking monomer (such as bisacrylamide), and water as solvent. Here we report a new and significant finding that a modified gel that employs only aqueous gelatin and methacrylic acid monomer with no crosslinking agent whatsoever shows a substantial increase in NMR sensitivity up to $4 s^{-1} Gy^{-1}$ and optical sensitivity up to 0.8 $cm^{-1} Gy^{-1}$ at 543 nm. This should allow for the NMR or optical measurement and for imaging of 3D dose distributions at doses between 1cGy and 1Gy. The dose response of the new gel dosimeter is linear up to 2.3 Gy. This new development opens up a possibility of new applications of the polymer gel dosimetry technique such as in vivo dosimetry as well as imaging dose distributions from diagnostic x-rays.

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References:

1. Maryanski et al., Med. Phys. **23**, 699 (1996)
2. Maryanski et al., Med. Phys. **23**, 1069, (1996).