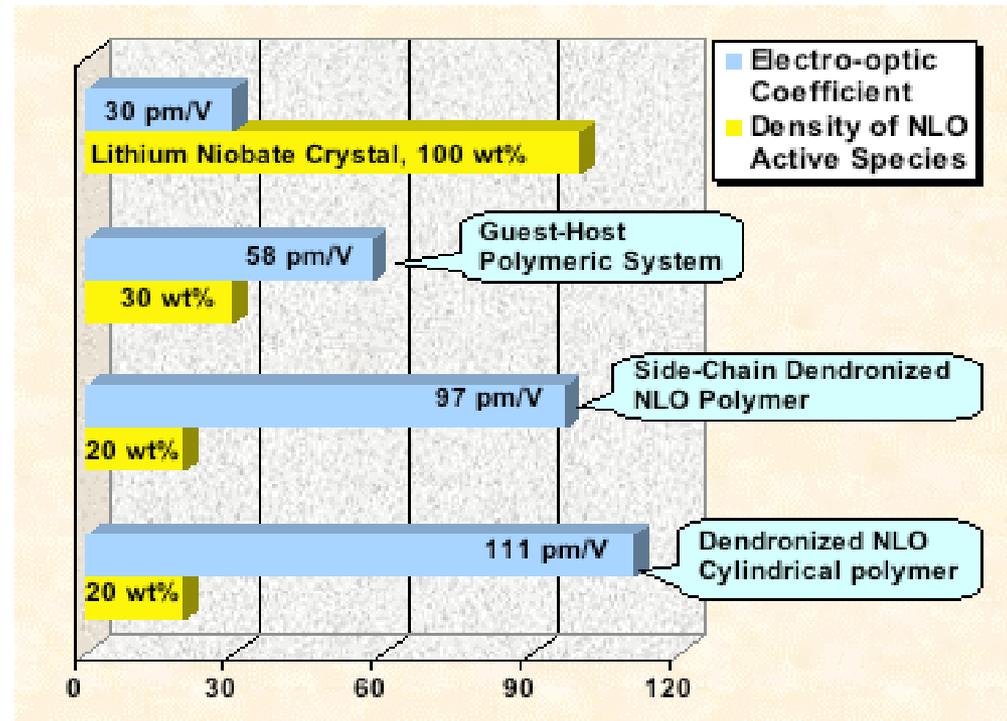


NIRT: Nanostructured Optoelectronic Materials

Larry Dalton, Bruce Robinson, & Alex Jen, University of Washington;
William Steier, University of Southern California **DMR-0103009**

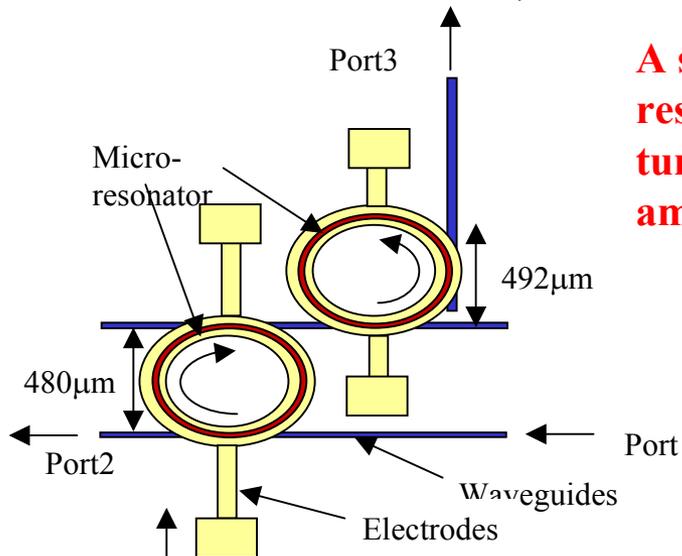
Statistical mechanical calculations have been employed to guide optimum use of steric interactions to oppose unwanted anti-ferroelectric ordering of electro-optic chromophores. Chromophores incorporated into dendrimers and dendronized polymers exhibit record electro-optic activity (100-150 pm/V at telecommunication wavelengths). A variety of new processing protocols have been developed for the incorporation of optoelectronic materials into 3-D ring microresonator structures for applications ranging from wavelength division multiplexing, to voltage tunable lasers, to wavelength selective filters, to new types of sensors.



Electro-optic activity is compared for the same chromophore (CLD-Science, 288, 119, 2000) incorporated physically into a guest-host polymer composite and covalently into two types of dendronized polymers. Results for lithium niobate are shown for comparison.

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A schematic representation of an electro-optic double ring resonator is shown at the top left and the use of this device to tune the output of a diode laser over the band of an erbium amplifier is shown at the bottom left.

Technology Transfer: Organic optoelectronic (EO, OLED, and sensor) materials have been provided to industrial and Federal research laboratories.

Education: Over thirty graduate students and ten undergraduate students have received training. The faculty participants have introduced research materials into Chemistry, MS&E, EE, and Nanotechnology graduate course offerings. All have lectured in the ACS/NSF Workshop on the Chemistry of Information Technology (2003) as well as community based education programs. Faculty and students supported by this program have participated in NSF sponsored programs for K-12 students. Collaborative research and education programs have been developed with Norfolk State U. and New Mexico Highlands U.

