STARTING AND GENERATION OF SUB-100fs PULSES IN Ti: Al₂O₃ BY SELF-FOCUSING**B. COUILLAUD***Coherent Laser Group, 3210 Porter Drive, Palo Alto, CA 94304, USA***ABSTRACT**

Ti:Al₂O₃ has the available bandwidth for directly generating very short tunable pulses at high average power. We introduce a modelocking technique based on self-focusing that has been used to modelock titanium sapphire in an aligned, GVD compensated cavity. When the peak power levels are sufficiently high we demonstrate that self-focusing takes place in the sapphire due to the optical Kerr effect. We show how the mode changing aspects of this self-focusing can be harnessed to drive and sustain the modelocking process. We also describe how the self-phase modulation resulting from the Kerr effect, in conjunction with the negative GVD introduced by the intracavity prism dispersion delay line leads to a quasi-soliton pulse whose parameters can be modified and its properties can be understood based on non-linear solution solutions previously described. We report 800 mW at sub- 100fs (when pumped with 8W) and 2.1W output with 120fs pulsewidth (pumped with 14W). Passive modelocking techniques are generally not self starting. We have developed a method based on mode-dragging to generate the intensity fluctuations required to initiate the modelocking process in Kerr Lens Modelocked lasers.