Abstract—In the paper we present measurement results of basic properties of semiconductor optical amplifier and demonstrate the effect of all optical wavelength conversion using cross-gain modulation (XGM) techniques.

Index Terms—Semiconductor optical amplifier, cross-gain modulation, wavelength conversion.

I. INTRODUCTION

In optical networks required components that are able to shift optical signals from one frequency to another. Wavelength conversion is a way to enhance the flexibility of an optical networks.

A wavelength converter changes the wavelength of an input signal to a new wavelength. Two different classes of solutions include: optoelectronic wavelength conversion and all optical conversion.

All optical wavelength conversion can base on four wave mixing, difference frequency generation, cross phase modulation or cross gain modulation techniques [1-2].

In presented paper we demonstrate XGM method.

II. BASIC FEATURES OF SEMICONDUCTOR AMPLIFIER

Initially we investigated basic parameters of SOA including: noise characteristics (ASE, NF), signal-noise competition and gain.

Fig. 1 shows measured spectral characteristics of amplified spontaneous emission as a function of amplifier bias current. $I_{SOA}$ ranges between 10 and 400 mA. For 400 mA bias current the maximum ASE power density (and gain) was observed at 1560 nm wavelength.

The competition between ASE spectrum and input signal power is shown in Fig. 2 and Fig. 3.

Fig. 1. Measured ASE spectral characteristics versus bias amplifier current.

Fig. 2. Signal – ASE competition, $P_{in}=0$, -10, -20, -30 and -40 dBm.

Fig. 3. Illustrate details of signal – ASE competition and amplifier saturation effect.
Measurement results of the gain and noise figure close to the saturation region are shown in Fig. 4.

The measured eye diagrams are presented in Fig. 6 and Fig. 7.

By optimizing signal powers it was possible to observe a clear diagram, Fig. 7.

REFERENCES