Oxide Etch without etching Aluminum

Etchant	Oxide Etch Rate (nm/min) [1]	Aluminum Etch Rate (nm/min)	Selectivity
Wet etching			
73% HF [1], [2]	1500	2.2	680
73% HF:IPA (1:1)	833	12	69
73% HF:IPA (1:2)	167	18	9
49% HF [3]	2300	4.2	547
40% HF [2]	844	68	12
40% HF:IPA (1:1)	400	122	3
40% HF:IPA (1:2)	233	145	1.6
BHF/Glycerol [4]	95	.55	170
Olin 777 Etch, NH_4F based [5]	Olin		
Pad Etchant [6], [7]	Pad Etch IV from Ashland		
BOE, Transene [8]		45-50 (BOE)	
NH_4F + CH3COOH+H_2O	Add propylene glycol to save Al		
Dry etching [8]			
RIE in CF_4 plasma			
RIE in SF_6, CHF_3, CF_4, 10% O_2			

[1]. Micromachined Transducers Sourcebook, Gregory Kovacs, Section 6.1.2, 88-89

[2]. Sacrificial Oxide etching compatible with Aluminum metallization, P.T.J Gennisen, P.J French, Transducer's 97

[3]. http://mail.mems-exchange.org/pipermail/mems-talk/2001-November/005515.html, Kirt Williams, kirt_williams@agilent.com

[4]. CMOS foundry based micromachining, Harrie A C Tilmans, Kris Baert, Agnes Verbist and Robert Puers, MME' 95 & J. of Micromechanics and Microengineering, 6(1996) 122-127

[5]. http://mail.mems-exchange.org/pipermail/mems-talk/2001-November/005528.html

[1] Etch rates are for thermal oxide, which etches 12 times slower than PECVD oxide in dilute HF [1]

Olin makes something called 777 Etch, which contains acetic acid, ammonium fluoride, ethylene glycol, and water. It is intended for use in etching SiO2 to open up bond pads. It supposedly doesn't attack the aluminum as HF based etches do.

[6]. http://mail.mems-exchange.org/pipermail/mems-talk/2001-November/005523.html

[7]. Double pass metallization for CMOS Aluminum, Johannes B¨uhler, J¨org Funk, Jan G. Korvink, Franz-Peter Steiner, Pasqualina M. Sarro, and Henry Baltes, Transducers' 95 360-363

[8]. http://mail.mems-exchange.org/pipermail/mems-talk/1999-June/002533.html
Isotropic etch recipe for silicon dioxide without attacking aluminum.